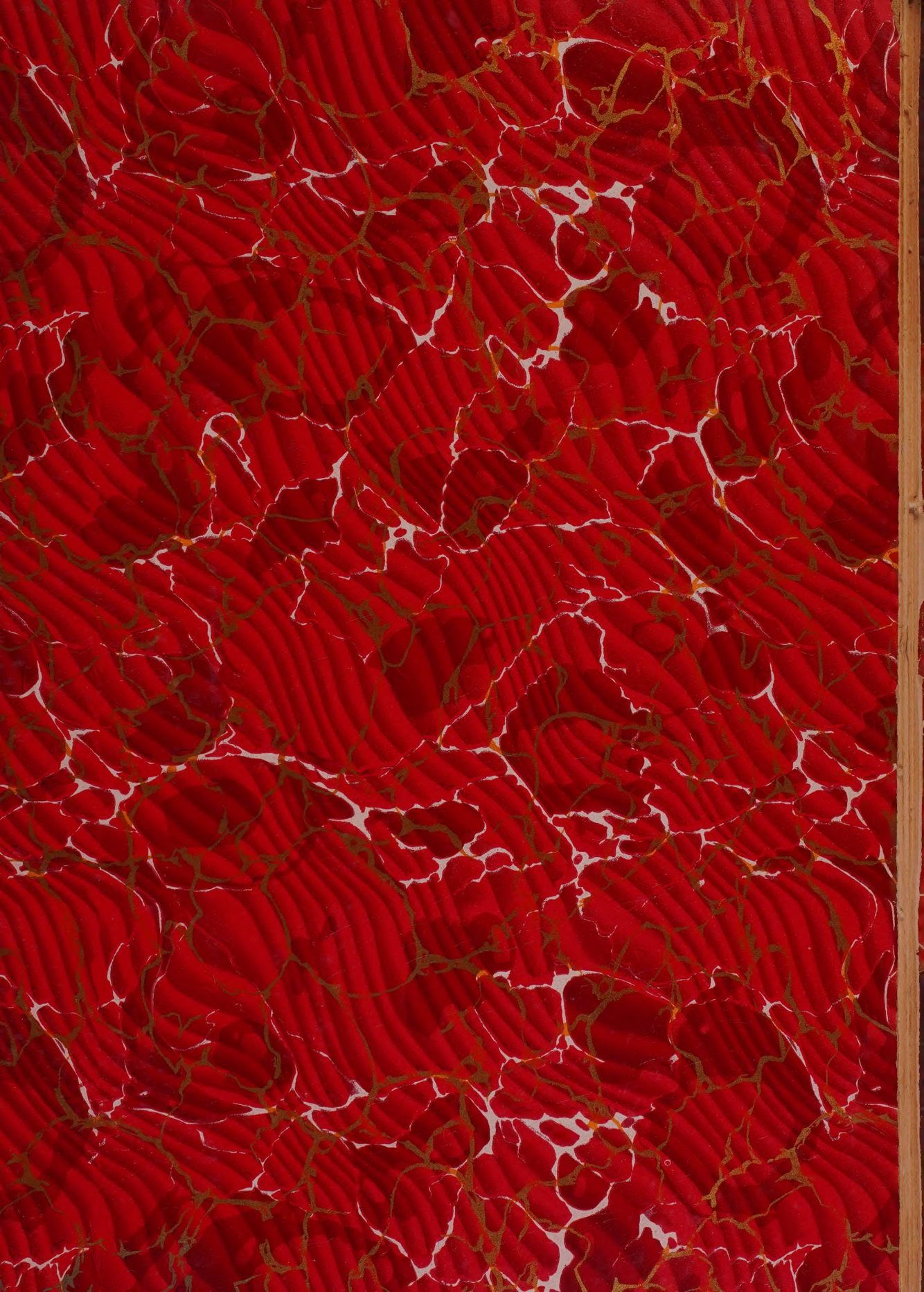


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ERNEST SETON-THOMPSON,

NATURALIST AND ARTIST, AUTHOR OF
"WILD ANIMALS I HAVE KNOWN," ETC.

ILLUSTRATED WITH
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BY
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And Many Others.



VOL. IV.—SEC. I.

NEW YORK

AKRON, O.

CHICAGO

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1901

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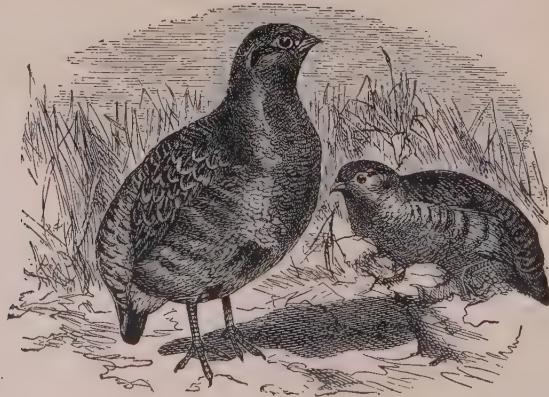
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THE ROYAL NATURAL HISTORY

VOL. IV



BIRDS

CHAPTER VIII

THE PICARIAN BIRDS — *continued*

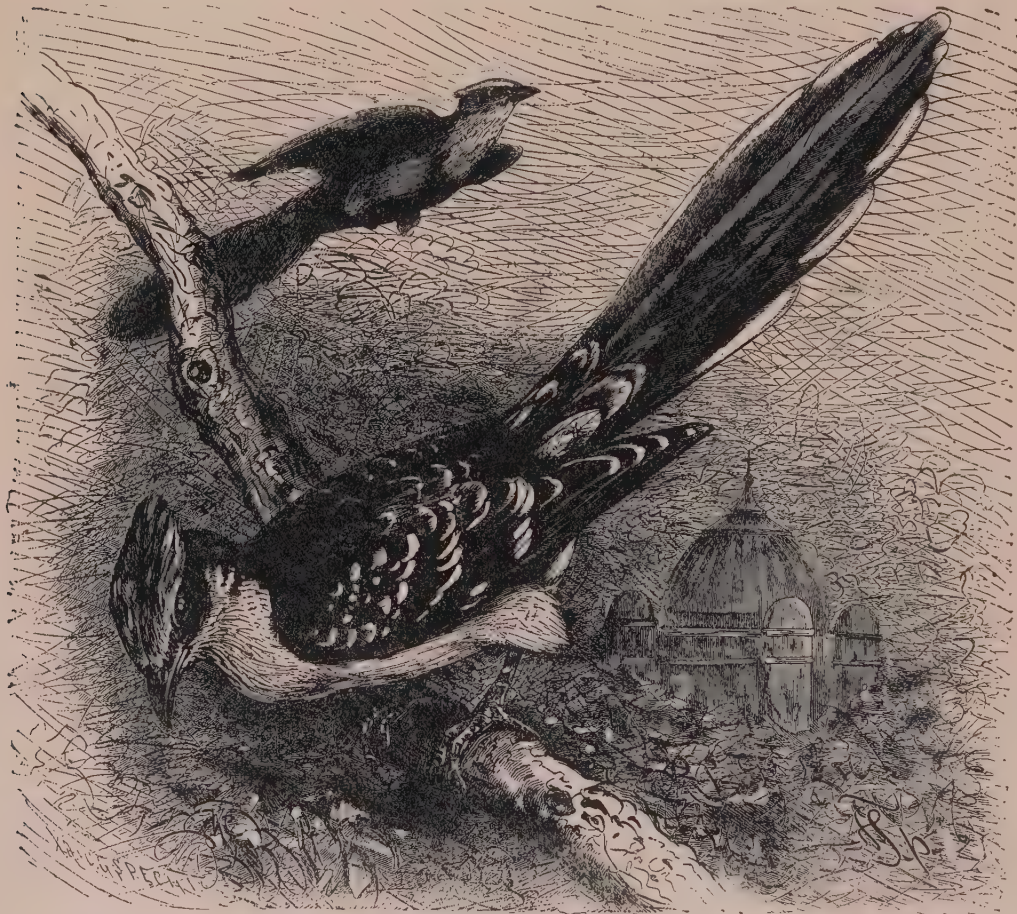
THE CUCKOOS

Family *CUCULIDÆ*

THE toucans form the last family of the subordinal group, known as climbing picarians, or Scansores. The cuckoos bring us to the first representatives of a second group, termed cuckoo-like picarians, or Cocyges. In this assemblage the palate of the skull is of the bridged, or desmognathous type, while the arrangement

(1763)

of the tendons of the muscles of the foot is different from that in the first group. As a family, the cuckoos are specially distinguished by having a zygodactyle foot, and a naked oil gland; the after shafts to the body feathers are wanting, and the arrangement of the feathers shows the tract on the back forked between the shoulders. They are birds of universal distribution, very varied in form and habits, some being entirely parasitic, while others build nests. They are divided into six subfamilies, and while the usual number of tail feathers is ten, in one group (*Crotophaginæ*) only eight are present; the other subfamilies are well distinguished.



GREAT SPOTTED CUCKOO.
(Three-eighths natural size.)

**Crested
Cuckoos**

The first representatives of the typical subfamily *Cuculinae* are the crested cuckoos, which, in common with the other members of the group, have pointed wings, and are strong fliers. The genus is distinguished by the presence of a crest on the head; and of its eight species five are African, while one (*Coccytes jacobinus*) is common to Africa and India, another (*C. coromandus*) is peculiar to the Indian region, and the last is European. Although

the great spotted cuckoo (*C. glandarius*) has twice occurred in England, its home is in Southwestern Europe and the Mediterranean countries, extending thence through Syria and Asia Minor to Persia, while in winter the bird ranges into Africa, as far as Cape Colony. It is of an ashy-brown color, white below, with a buff-colored throat, and is easily distinguished by its crested gray head and long tail, which is broadly tipped with white. The length of the bird is about sixteen inches. Its note is described by Canon Tristram as *kee-ow*, *kee-ou*, and it has an alarm note resembling the word *cark*, as well as a third note, like *wurree*, *wurree*. It is parasitic, like the members of the genus *Cuculus*, but does not victimize small birds like the true cuckoos, selecting the nests of crows and magpies, whose eggs bear a considerable resemblance to its own. The great spotted cuckoo often places two, or even four, of its eggs in a nest, where the young cuckoos often live in peace with the offspring of the foster parents, and, so far as is known, not attempting to eject the rightful owners. The Indian pied crested cuckoo (*C. jacobinus*) lays blue eggs, resembling in color those of the babbling thrushes (*Crateropus* and *Argya*); in whose nests it places them. Apparently the young cuckoo ejects the rightful owners, when the young are hatched, as the babblers are often seen in attendance on their parasitic dependants without any of their own young being of the party. Sometimes the cuckoo puts two of its eggs into a babbler's nest, and it is said to break some of the foster parents' eggs to make room for its own. Colonel Butler says that when they discover a nest of a babbler, which does not suit them to lay in, the cuckoos invariably destroy the eggs already there by driving a hole into them with their bills, and sucking the contents.

Hawk Cuckoos The six species of hawk cuckoos are remarkable for their exact resemblance in color and flight to a sparrow hawk, being gray birds with a great deal of rufous below, large yellow eyes, and very broadly banded tails. They lay white or greenish-blue eggs, and one species (*Hierococcyx sparveroides*) is said to build its own nest and sit on the eggs. This fact has been recorded in the Nilgiri hills of Southern India, but in the Himalayas the bird is stated to be parasitic on the babbling thrushes.

True Cuckoos While the hawk cuckoos may be distinguished from the crested cuckoos by the absence of a crest, the true cuckoos differ from them by the shape of the tail, in which the outer feathers are nearly of the same length as the others; instead of decidedly shorter. Moreover, the tail feathers lack the transverse dark bars of the hawk cuckoos. The genus is represented by ten species, all very similar to one another, and hawk-like in coloration and appearance, the old birds being gray while the young are more or less rufous, the Oriental Sonnerat's cuckoo (*Cuculus sonnerati*) having, however, the plumage for the most part rufous barred with black. Of the ten species, four are African, one Australian, and the rest Indian. Their notes vary greatly, only one other species besides the European having the "cuckoo" note from which the bird takes its name, this being the South African cuckoo (*C. gularis*), which has a note similar to that of the common species, but more slowly uttered, and the first syllable not in such a high key. The red-chested cuckoo of Africa (*C. solitarius*) has a whistling note, on account of which it is known to the colonists at the Cape by the name of *Piet-mijn-vrouw*,

while the black cuckoo (*C. clamosus*) is, as its Latin name implies, a noisy bird, uttering a very loud harsh note. The Indian cuckoo (*C. micropterus*), has a note, which Mr. Oates renders as *bho-kusha-kho*, while the Asiatic cuckoo (*C. intermedius*), on the other hand, has only a single note, a guttural and hollow-sounding *hoo*, resembling the cry of the hoopoe. One of the most interesting of all birds is the common cuckoo (*C. canorus*), not the least remarkable feature in its conformation being its great similarity to a hawk, as not only evidenced by its color and form, but by its mode of flight, and which is so marked that the bird is always mobbed by smaller birds, as if it were really a hawk. Its color is gray above and



COMMON CUCKOO.
(One-half natural size.)

white below, regularly barred with black like a hawk, while the throat is buff. It has also long thigh feathers, like those of an accipitrine bird, so that with its yellow eyes the resemblance is complete, and when flying it is by no means easy to tell at the first glance whether it is a cuckoo or a hawk in the air. An accustomed eye may at last detect the more elongated look of the head, owing to the long bill of the cuckoo, whereas a hawk in flight often looks as if it had no bill at all, so blunt is the aspect of a hawk's head when seen at a little distance. The interest in the history of the cuckoo is, however, concentrated on its nesting habits, and the success with

which it imposes on other birds in getting them to rear its young. There can scarcely be any doubt that the number of males considerably exceeds that of the females, and some naturalists not only speak of the species as polyandrous, but declare that the female bird does all the courting. Certain it is that the presence of a female cuckoo excites the interest of more than one male, as may be seen in springtime by those who know how to detect what has been well described as the "water-bubbling" note of the female cuckoo, which Brehm renders as *kwik-wik-wik*, and Seebohm as *kwow-ow-ow-ow*. The female, on giving utterance to this note, is answered at once by every male in the neighborhood, and they lose no time in flying toward the tree where she is seated, so that there are often quarrels and fierce fights among them. It is during the love season that the double call *cuc-cuc-koo* is heard, as if the male were trembling with passion. Although the general belief is that cuckoos do not lay many eggs, it has been recently concluded that each hen deposits about twenty in the course of the season. The variability in the coloration of the eggs is well known, and it appears that in each individual the coloration of the eggs is hereditary. That is to say that cuckoos brought up by meadow pipits always select that species to be the foster parent of their own young in course of time, the same being the case with regard to hedge sparrows, wagtails, and other ordinary victims of the cuckoo. The small size of the egg, and the extraordinary similarity which it often shows to the egg of the foster parent, render it difficult to distinguish the cuckoo's egg from those of the rightful owner of the nest; and sometimes a cuckoo will lay a blue egg exactly like that of the redstart or pied flycatcher, the nest of which it is about to utilize. This is perhaps the most curious instance known of strict similarity in color, the true cuckoo's egg looking merely like a somewhat larger egg of the redstart. That such eggs are really those of cuckoos was, however, proved by Messrs. Seebohm and Elwes, who were in Holland together when a redstart's nest was brought to them, the eggs of which were hard set. On blowing them the young birds had to be picked out, and the little cuckoo exhibited the characteristic zygodactyle foot perfectly formed. In the case of eggs laid by the cuckoo in wagtail's nests and those of other birds, the resemblance is exact, and when a cuckoo's egg is found in a nest where the eggs of the foster parent are different, it is probable that the cuckoo has not been able to find a nest at the moment in which the eggs belong to its own hereditary type. The nest of a sedge warbler has indeed been found with a cuckoo's egg in it, which was the exact counterpart of those of the foster parent; and a few days after, the finder, having noticed the female cuckoo to be hovering about the neighborhood all the time, found a cuckoo's egg of the same sedge warbler type in a reed bunting's nest, where, of course, it looked thoroughly out of place. From these facts it would appear that a cuckoo, laying a "sedge warbler" egg, had been unable to find a second sedge warbler, and had been constrained to put it into a reed bunting's nest. A series of nests of the meadow pipit, each with a cuckoo's egg, has been recently presented to the British Museum, all of which were taken near Portsmouth in 1893. There would seem to have been three cuckoos who visited these nests, since three of the nests contain a grayish type of egg, three an egg of a lighter character, and three an egg of a purplish gray type. The story of the way in which the young cuckoo ejects the young of its foster parent from their

rightful home is well known. The cuckoo feeds entirely on insects, and it is believed to be the only bird which eats hairy caterpillars. It has also been accused of devouring eggs, and this idea may have arisen from eggs being found in the mouth of a cuckoo. These were no doubt the bird's own eggs, which it was conveying to some nest.

Golden
Cuckoos

Represented in India and Australia by the nearly allied group of the bronze cuckoos (*Chalcococcyx*), the golden cuckoos form a genus confined to Africa, and represented by four species. These birds differ from the true cuckoos by their metallic coloration, of which the latter show no



YELLOW-BILLED CUCKOO.
(One-half natural size.)

trace. Among them, the emerald cuckoo (*Chrysococcyx smaragdineus*) is one of the most beautiful of birds, being of a brilliant metallic emerald green on the upper parts, and also on the throat and chest; while the breast and under parts are bright yellow. Found all over tropical Africa, it inhabits the wooded country; and is conspicuous, not only from its brilliant coloration, but also from its habit of sitting on the top of a tree, sometimes for hours together, uttering its loud call of love or

defiance. The typical golden cuckoo (*C. cupreus*), illustrated on our first page, is a somewhat smaller species, with the plumage of a metallic golden-green hue, the throat being white. Mr. Layard says that "this beautiful little cuckoo is known by the name of Didric, from its oft-repeated mournful cry of *di-di-di-didric*. We have frequently seen a dozen or more in a morning, while their loud notes were incessantly ringing in our ears; they are, however, so shy, that we only procured three specimens in as many months. When calling, they perch on the summit of some dead branch, ready to do battle with any male, or engage in an amorous chase after any female that comes within their ken. They pursue each other with great ardor, turning, twisting, and dashing about with great rapidity. The stomachs of those examined contained nothing but small insects, chiefly swallowed whole." Mr. Ayres has found the remains of an egg of the Cape sparrow in the stomach, and as the cuckoo is parasitic on this species it looks as though it sometimes devoured the eggs of the foster parent to make room for its own.

American Cuckoos The American cuckoos, although of sober gray and brown shades of coloring, and resembling the true cuckoos in this respect, may always be distinguished by their oval and not rounded nostrils. They are gray or brown in color, generally with an olive gloss, although two species have rufous backs. Except as regards their nesting habits, they are nearly allied to the cuckoos of the Old World. One of the best-known species is the yellow-billed cuckoo (*Coccyzus americanus*), which is olive brown in color, with white tips to the tail feathers; the under parts being white, and the inner side of the quills rufous. This cuckoo, together with its near ally, the black-billed cuckoo (*C. erythrophthalmus*) is migratory to the United States in summer, the latter extending its breeding ranges as far to the north as Manitoba and Labrador. Dr. Coues says that the ways of these cuckoos are shy and retiring. They are more often heard than seen, "passing from one tree to another stealthily, with a rapid, gliding, noiseless flight, and they often rest motionless as statues for a long time, especially when crying out, or when they have detected a suspicious object. The peculiar notes of this bird, sounding like the syllables, *koo-koo-koo*, indefinitely repeated, are probably uttered more frequently during the atmospheric changes preceding falling weather, and have given rise to the name Rain crow, by which both our species of *Coccyzus* are known to the vulgar." He also says that they are great plunderers of the eggs of small birds, and are even said to devour the helpless nestlings. The nest is said to be like that of a crow, but poorly constructed. In connection with the supposition that our English cuckoo lays its eggs at intervals, it is interesting to know that the yellow-billed cuckoo undoubtedly does so, since in its nest there have been found fresh eggs and young in all stages, from the bird just hatched to the one able to fly, showing that there must be a considerable interval between the laying of each egg. Audubon gives an instance in which as many as eleven young birds had been hatched in a season. The eggs are pale green.

Koels Found only in the Indian and Australian regions, two species being peculiar to the former and four to the latter, the koels show a remarkable sexual difference in color, the males being black, and the females rufous with black bands. In most birds, when the parents differ in plumage, the young at first

resemble the hens, but in the instance of the koels the young of both sexes are black like the cocks. The koels may also be distinguished from the preceding genus by having a much rounder and stouter bill than in the preceding genera. The tail is long and wedge-shaped. Regarding the coloration of the young, Mr. Whitehead, writing of the Philippine koel, or phow (*Eudynamis mindanensis*), asks "Why should the young birds not follow the general rule, and take the plumage of the



YOUNG MALE OF THE INDIAN KOEL.
(One-third natural size.)

female, or have a plumage distinct from that of both parents? The answer to this riddle appears to be that the phow lays its eggs in the nest of the yellow-wattled myna. The young cuckoo being black does not differ from the young myna, and so the deception is carried on until the young bird can take care of itself. If the young followed the general rule, and resembled their mother in being of a brown color, the mynas might not feed them. The myna breeds in holes of old rotten

trees, sometimes using woodpeckers' holes, making it more difficult to see the intruder in the dark; and no doubt, when the young bird emerges into daylight, it would startle the old birds to see the young cuckoos of any other color. One of the young cuckoos was shot while being fed by the foster parents, and no doubt the young cuckoo gets rid of the nestling myna at an early period. Of course it might be argued that it would not be necessary to deceive the myna, for other birds take care of their parasites, but perhaps the myna has a greater knowledge of the world." The Indian koel (*E. honorata*) is the rain bird of India. The bird is parasitic on crows, and it would appear from the notes of naturalists in India that the koels



EGYPTIAN COUCAL.
(One-half natural size.)

must look after their offspring to a certain extent, for they have been seen feeding their own young ones after they have left the nest.

Distributed over a great part of Africa, India, China, and southward through Malaysia to Australia, the coucals form not only a genus, but a separate subfamily. They are ground birds, of medium or large size, remarkable for the long spur on the first toe, whence their English name is derived. They build nests, and lay several white eggs, the shell of which is chalky, showing an approach to the remarkable eggs of the anis described further

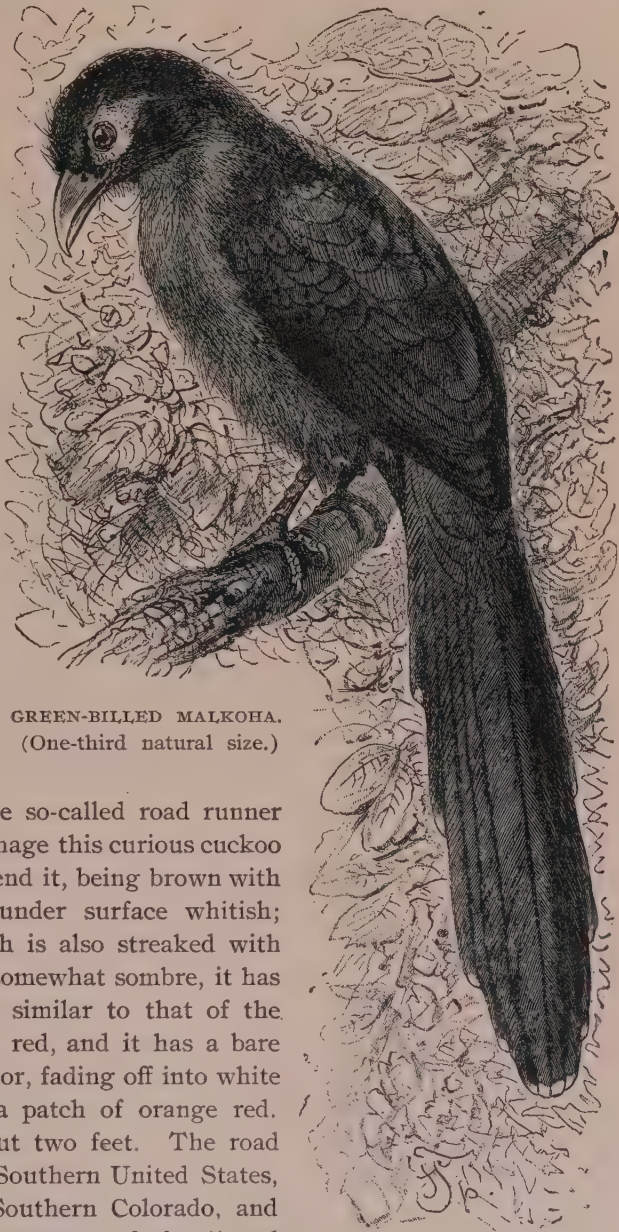
**Long-Clawed
Coucals**

on. The general color of the coucals is red and black, but some of them are entirely black, while the Australian pheasant cuckoo (*Centropus phasianellus*) is banded with brown and buff. The young birds of all the other species have a similar kind of plumage, and it is said that some species also possess a winter garb or "seasonal plumage." If this is the case, it lasts for a very short period. The Indian coucal (*C. sinensis*) is a species of large size, measuring nearly two feet in length, and black in color, with the mantle and wings chestnut, and having a blue gloss on the head and a green gloss on the under parts. It is found all over India and Ceylon, and, like the rest of the genus, has a curious howling note, *whoot, whoot, whoot, whoot*, followed after a pause of four or five seconds by *kurook, kurook, kurook, kurook*. The nest is generally domed, and is a rough structure, described by Mr. Hume as a "hollow, oblate spheroid, some eighteen inches in external diameter, and from six to eight inches in height, with a large hole on one side, from the entrance of which to the back of the nest inside may be twelve inches. This, of course, is not large enough to admit the whole bird, so that, when sitting, its tail is commonly seen projecting outside the nest. The latter is placed at varying heights above the ground, in the centre of thick, thorny bushes or trees. It is usually made of dry twigs, lined with a few green leaves, but all kinds of odds and ends are at times incorporated into the fabric. Occasionally quite different materials are made use of, the nest consisting almost wholly of leaves, rushes, or coarse grass."

Rain Cuckoos With these birds we come to another subfamily, known as the bush cuckoos (*Phœnicophæinæ*), and including upward of sixteen genera. Their bright metallic plumage, and short, rounded wings, show that they are resident in the countries where they live, and are not migratory like the long-winged cuckoos. They are mostly Indian and Malayan, but one genus (*Ceuthmochares*) is African; while two genera (*Saurothera* and *Hyetornis*) belong to the New World. With the exception of *Coua*, which is a Madagascar form, they have all some bright colors on the face or bill, the latter being in many of the genera parti-colored and brilliant. The rain cuckoos in the West Indies are only found inhabiting the Greater Antilles and the Bahamas. They attain to a size of eighteen or twenty inches, are mostly of an ashy-brown color, with rufous wings, with white-tipped tail feathers, these having a black bar before the tip. The Jamaican species is a bird of retiring habits, generally sitting immovable in a dull and sluggish manner, but on alighting in a tree it "traverses the branches with facility by a succession of vigorous jumps, when it appears active enough." The nest is placed high on a tree, and is a loose, flat structure of twigs, the eggs being chalky white. In India and the Malayan countries there occurs an assemblage of genera of bush cuckoos, of which the best known are the malkohas (*Rhopodytes*). These birds are met with in gardens, thin tree jungles, and secondary scrub, being and having a marvelous capacity for making their way through dense cover. The notes of the malkohas seem to vary considerably, being described as a "cat-like chuckle" in one species, in another as a "hoarse chatter, much like that of a magpie," while another of the malkohas has a "cat-like mew." These cuckoos build their own nests, and lay white eggs.

Ground

Another subfamily (*Neomorphinæ*) is represented by the four genera Cuckoos of ground cuckoos, all of which are terrestrial birds with powerful feet for running, and weak wings in which the secondary quills are as long as the primaries. In Borneo and Sumatra the pheasant cuckoos (*Carpococcyx*) represent the group; the species from the former island being two feet in length, with the aspect and ways of a game bird. In South America the subfamily is represented by the genus *Neomorphus*, which extends from Northern Brazil to Guiana, Amazonia, and Ecuador, thence to Colombia and to Nicaragua. All the five species of this genus are extremely rare, and nothing is known of their habits. In all the genera above mentioned the bill is very stout, but there remain the two American genera *Geococcyx* and *Morococcyx*, in which it is longer; a familiar example of the former of these being the so-called road runner (*Geococcyx mexicanus*). In plumage this curious cuckoo has nothing striking to recommend it, being brown with rufous or white streaks; the under surface whitish; and a buff-colored throat, which is also streaked with black. But if its coloration is somewhat sombre, it has some bright color on the face, similar to that of the preceding genera, for the iris is red, and it has a bare space round the eye of a blue color, fading off into white behind, and then followed by a patch of orange red. The length of the bird is about two feet. The road runner is an inhabitant of the Southern United States, from Texas to New Mexico, Southern Colorado, and California. It has obtained its name of the "road runner" from the speed with which it flies over the ground, some idea of which may be gained from a statement of Colonel Stevenson, that when in Southern California he saw on two occasions the ranchmen of that part of the country



GREEN-BILLED MALKOHA.
(One-third natural size.)

chase one of these birds on horseback for a distance of a mile or more at full speed, when the cuckoo, though still in advance, would suddenly stop and fly up among the upper limbs of some stunted tree or bush near the roadside, and the rider having kept the bird in view all the way would dismount and easily take the exhausted bird from its perch alive.



THE ROAD RUNNER.
(One-fourth natural size.)

Savana and
Guira
Cuckoos

The last subfamily of the cuckoos is represented by the so-called savana and guira cuckoos, three of which belong to one genus, while the fourth constitutes a genus apart. Distinguished from all other cuckoos by having only eight tail feathers, these birds are further remarkable for their eggs. Externally these eggs are blue, covered with chalky white scratches, produced by contact with the lining of the nest; and it appears that this blue color belongs only to the outer covering, so that when this is removed the true eggshell, which is white, is revealed. The guira cuckoo (*Guira*) has a very slender beak, and a crest; the plumage being brown streaked with black, the under surface buff, and the back white, while the length of the bird is about eighteen inches. It inhabits Brazil and Paraguay. The members of the other genus are black, and have an extraordinary bill with a kind of high and narrow keel on the upper mandible, looking as if it had a ridge along it. Of the three species, the

largest is *Crotophaga major*, which is eighteen inches in length, and is found from Brazil and Amazonia to Guiana, and also extends to Colombia. The other species, *C. anis* and *C. sulcirostris*, are smaller, not exceeding thirteen inches in length; the *anis* inhabiting much the same areas as its larger relative, but being found also in the West Indian islands, while it has occurred in the Southern United States. It has a smooth bill, while the latter has several grooves on the side of the bill. It likewise occurs in the Southern United States, and extends throughout Central America to Colombia and Peru, but does not seem to reach Brazil and the other countries of South America.

The savana cuckoos are gregarious birds, and it will be seen from the notes given below that they nest in company. Señor Alfaro says that in Costa Rica he found the *zopilotillo*, as it is called, very abundant in the fields near Tambor, a little town about twenty miles northwest of San José, where along the hedgerows and in the scrubby timber they find their insect food, as well as on the hides of the cattle. The wood ticks or "garrapatos," which are found on the legs and about the head and neck of the cattle, are esteemed above all else a favorite morsel. The bird is also called the *tijo-tijo* in imitation of its peculiar notes, which seem to repeat the word *tee-ho* over and over again. He likewise tells of the finding of three nests, one of which was situated in the branches of a mango tree, and contained fourteen eggs. Noticing on one occasion one of these birds building its nest, he returned in a week's time, and found, to his surprise, not only the nest completed, but containing six eggs, while in the thorns and leaves about it were scattered seven more. He writes that "in the finding of some of the eggs scattered in the leaves was revealed one of the architect's peculiarities. A hole had been left in the centre of the nest, and only recently filled with leaves, whose fresh green color testified that they had been cut and placed there later than the others, forming the carpeting to the bottom of this common incubator. The eggs were all fresh, the six occupying the nest having the characteristic white calcareous surface perfectly clean, and without the slightest variation in color. Not so with the eggs found about the outside of the nest: those found in contact with the leaves had taken on a dirty yellowish tinge, while those suspended among the leaves and thorns showed various spots and lines of the lustrous blue color forming the base for the chalky external coat."

THE PLANTAIN EATERS

Family *MUSOPHAGIDÆ*

Having many characteristics in common with the cuckoos, the plantain eaters, or touracos, of Africa, are regarded as indicating a separate suborder, distinguished by having the oil gland tufted and after shafts to the body feathers, while the feet are not wholly zygodactyle, the fourth toe being capable of being turned either backward or forward. The tail feathers are ten in number. Twenty-five species are known, which may be divided into two sections, one including those which have crimson quills, and the other those in which there is no red in the wings.

Crimson

Winged

Plantain

Eaters

These birds are often called louris in South Africa, where they frequent the forest districts, building an open nest of sticks in a bush, and resembling that of a pigeon, the egg being also white like that of the last-named birds. Of Fraser's plantain eater (*Turacus macro-rhynchus*) Mr. Büttikofer gives some notes in his account of the birds collected by himself in Liberia, stating that it is a splendid and very lively bird in a wild state, always keeping to the densest crowns of the trees in the virgin forest, where it



GIANT PLANTAIN EATER.
(One-fifth natural size.)

lives in pairs or in families after the breeding season. It is so shy that it would not be easily found by the hunter if it were not for its crow-like voice, interrupted now and then by a mewling exactly like that of a cat. When not disturbed, these birds can be very noisy, flapping their beautiful red wings, and running after each other like squirrels among the branches. As their bright wings would render them too obvious to their enemies, they seldom fly very far at once, but advance by running

through the foliage of the trees, hidden by the resemblance of their color to that of the surrounding foliage. Their food consists of different kinds of wild fruits, and insects were never found in dissected specimens. A very interesting fact has been discovered with respect to the coloring matter in the wing of the touracous, which consists of a kind of copper called turacine. It was at one time supposed that this coppery impregnation of the coloring matter of the bird's wing could be accounted for by its picking up grains of malachite, but the touracous are birds which live in trees, and do not apparently descend to the ground, while the red feathers have been assumed by specimens in captivity, some of which molted more than once.

Giant
Plantain
Eater

The sole representative of this genus (*Corythæola cristata*) is the largest of all the family, measuring nearly three feet in length, and is remarkable for its fine crest and varied coloring. The upper surface is blue, the head and crest bluer, the tail feathers yellow with blue bases, and a broad bar of black near the end; neck blue, with the chin and cheeks white; rest of under surface of body rufous brown; bill yellow with the tips scarlet; eyes red. This handsome bird is found all over the forest district of West Africa from Senegambia to Angola, and extends throughout the Congo region to Equatorial Africa. Mr. Büttikofer says this plantain eater is confined exclusively to the virgin forest, where it lives in companies of five or six together in the crowns of the tallest trees, generally out of reach of gunshot. It feeds upon a kind of bush plum and other wild fruits, of which an enormous quantity is sometimes found in its crop.

CHAPTER IX

THE PICARIAN BIRDS—*concluded*

TROGONS TO OIL BIRDS

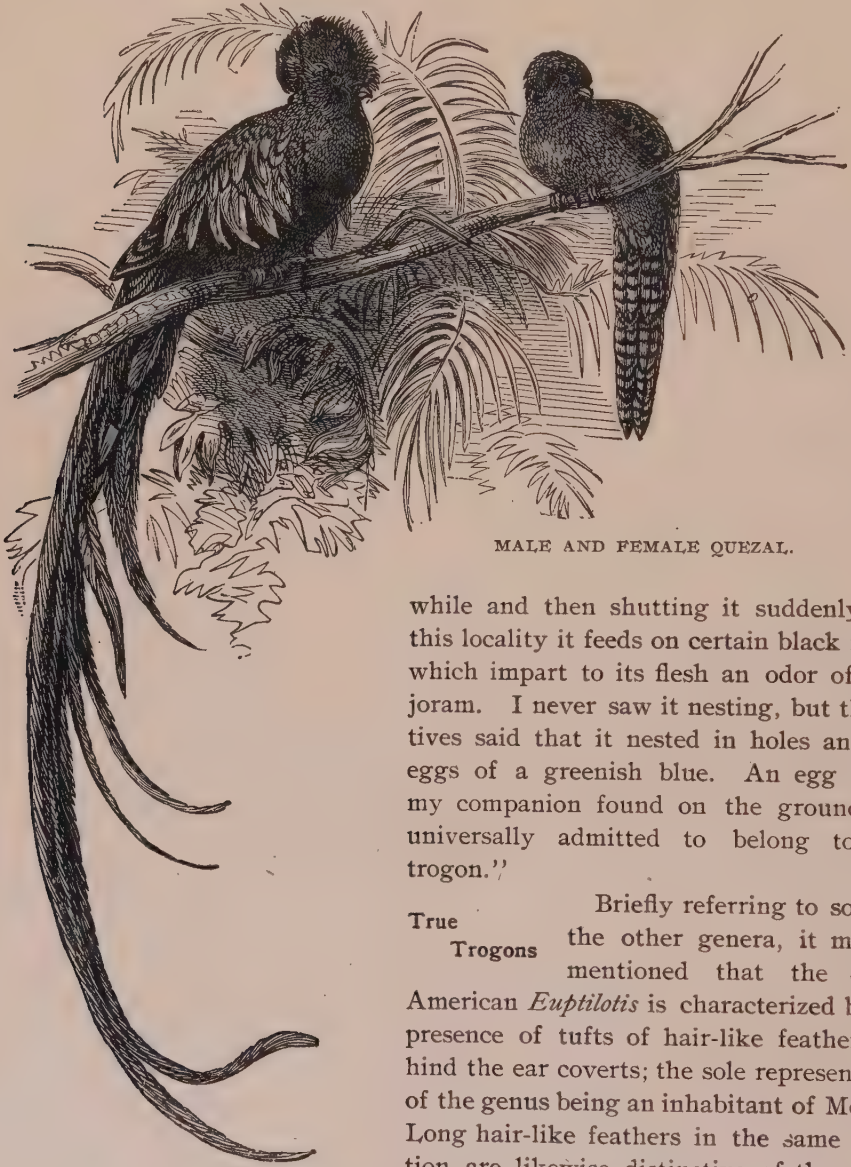
Families *TROGONIDÆ* to *STEATORNITHIDÆ*

THE trogons, remarkable for their brilliant coloration and soft plumage, constitute not only a distinct family (*Trogonidæ*), but are likewise regarded as representing a special suborder (*Heterodactyli*), mainly distinguished from the Picarian families described in the preceding chapters by the structure of the tendons of the foot. In these birds the second toe is turned backward, and the third and fourth toes are moved by the splitting of one tendon, while a second tendon is likewise divided into two branches to supply the first and second toes. They are further characterized by having the palate of the slit (schizognathous) type; and the feather tract on the back is continuous in place of being forked. Then, again, we may notice that the hinder border of the breastbone has four notches; the intestine is provided with a pair of blind appendages (*cæca*); the oil gland is naked; and the after shafts of the feathers of the body are remarkable for their length. Behind the head is a patch of loose skin, and the whole skin is of such a fragile and delicate nature, while the feathers are so loosely attached, that the preservation of these birds tries to the utmost the skill of the taxidermist. As regards their geographical distribution, trogons are found in the Oriental region, Africa south of the Sahara, and Central and South America; one species alone (*Trogon ambiguus*) being stated to range as far north as Texas and Arizona. Very numerous in Central and South America, in Africa, though widely distributed, they are but poorly represented in species, but become more abundant in the Oriental region, although not ranging eastward of the islands of Java and Borneo. Fossil trogons have been discovered in Tertiary deposits in Southern France, belonging to the upper part of the Oligocene period. Of the eight genera into which the family is divided, five occur in Central and South America (among these being the typical *Trogon*); and it is noteworthy that the latter and one other genus are exclusively island forms, the one being confined to San Domingo and the other to Cuba. The three African trogons are comprised in a single genus (*Hapaloderma*); but there are two Oriental genera, one of which (*Hapalarpactes*) is peculiar to Java and Sumatra.

Long-Tailed
Trogons Of these magnificently-plumaged American representatives of the family there are four species, among which we may especially notice the quezal (*Pharomacrus mocinno*) of Guatemala. Every naturalist who has had the good fortune to see this bird in its wild state describes it as ex-

tremely beautiful; and even when preserved, its plumage differs from that of its congeners in its retention of the original coloration,—a skin which has been exposed to the light in the British Museum for some half a century still being almost as brilliant as when first mounted. In the other species, on the contrary, the bright yellow or crimson of the breast fades with sad rapidity. The range of the quezal extends from Guatemala to Panama, but as considerable numbers of the skins of these birds are sent yearly to Europe as plumes for bonnets, the species has become very scarce. Ornamented with a large rounded crest on the head, the male bird has the ground color of the plumage a brilliant metallic green, while the throat and chest are likewise metallic green, as are also the wings and upper tail coverts; the two central plumes of the latter being enormously developed, and fully four times as long as the tail, while the rest of the under parts, from the chest downward, are deep blood red. The median wing coverts are metallic green, and so produced as to form elegant drooping plumes; while the outer tail feathers are white with black bases. The female is much less brightly colored than her mate, having a brownish breast, and the bill black instead of yellow. The head is golden green, and the outer tail feathers are white barred with black. Mr. Salvin gives an interesting account of his hunting the quezal in Guatemala. After a difficult march through the forest, the way barred by swollen torrents and fallen trees, he at last managed to get within sight of one of the birds, which had been attracted by his guide imitating its notes. This imitation is not difficult, since the whistle is described as “a low double note, *whe-oo, whe-oo*, uttered softly at first, and then gradually swelling into a loud but not unmelodious cry; this succeeded by a long note which begins low, and, after swelling, dies away as it began.” The other cries of the bird are harsh, discordant, and not so easily imitated. When detected, the bird was observed sitting almost motionless on its perch, merely moving its head slowly from side to side, with the tail somewhat raised and occasionally jerked open, and again as rapidly closed, thus causing a vibration of its long upper coverts. In spite of the length of the streaming tail feathers, which appear to form no bar to its progress, the flight of this trogon is straight and rapid. Of the golden-headed trogon (*P. auriceps*), of Peru, Mr. Stolzmann writes that it is exclusively a bird of the forests, frequenting the lower branches of the highest trees at a considerable distance from the ground. It is generally seen in pairs, but sometimes two or three pairs may be met with together. “I was struck,” he writes, “with the vertical position which it assumes on the large horizontal boughs, and I observed by the aid of my field glasses that, instead of perching on the upper surface of the branch it remains attached to the side of the latter just as woodpeckers glue themselves to the trunks and vertical branches of trees. Its flight is rapid but weak. It feeds on fruits, especially on nectandras; and in the stomach of one I found a nectandra fruit so large as to fill the whole stomach. I suppose, therefore, that the trogon, like the guacharo, rejects the nut after having digested the flesh, because otherwise some time must elapse before it could swallow another fruit. The species has two cries, both well known to me: one like a mocking laugh is seldom heard; the other is a plaintive *ha-hau*, with the second syllable much prolonged. It has a ventriloquial quality and often

deceives the hearer, who fancies that the bird is ever so far off, whereas it is close at hand all the while. At Cuterro I had a good opportunity of observing its singular way of clinging in a vertical position to the trees, spreading its tail out the



MALE AND FEMALE QUEZAL.

while and then shutting it suddenly. In this locality it feeds on certain black fruits, which impart to its flesh an odor of marjoram. I never saw it nesting, but the natives said that it nested in holes and laid eggs of a greenish blue. An egg which my companion found on the ground was universally admitted to belong to this trogon."

True

Trogons

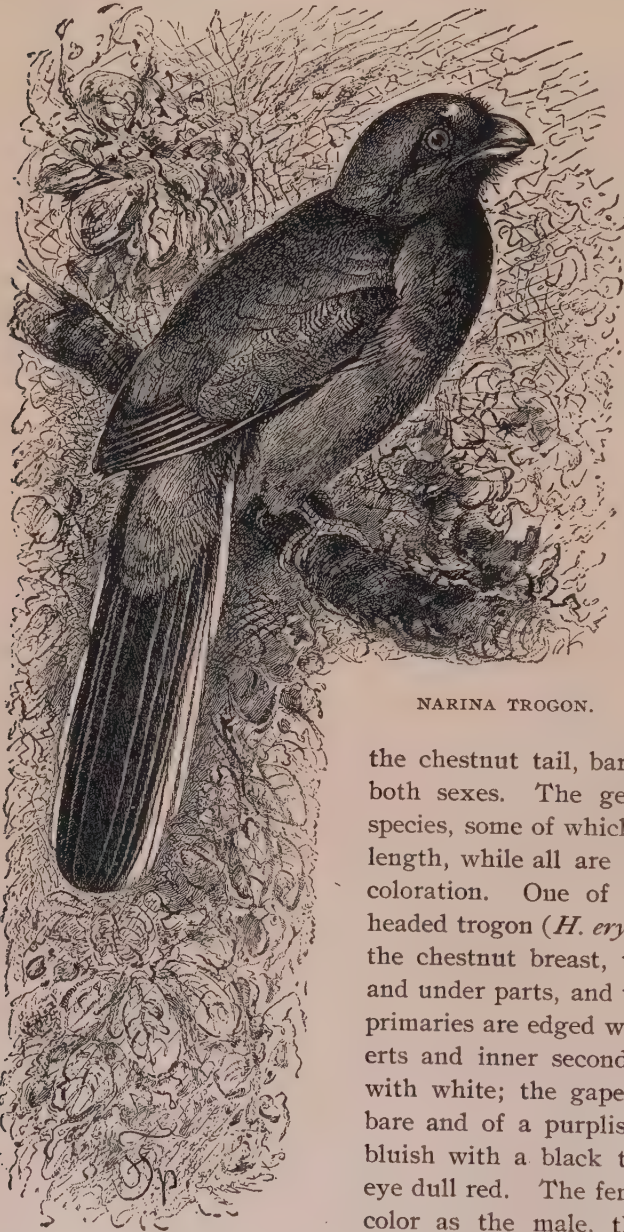
Briefly referring to some of the other genera, it may be mentioned that the South American *Euptilotis* is characterized by the presence of tufts of hair-like feathers behind the ear coverts; the sole representative of the genus being an inhabitant of Mexico. Long hair-like feathers in the same situation are likewise distinctive of the single species of *Tmetotrogon*, which is confined

to the island of San Domingo; while in the Cuban *Prionotelus*, of which there is also but one species, the tail feathers are deeply notched. With the single exception of a species (*T. ambiguus*) occurring just within the southern limits of the

United States, the members of the typical genus *Trogon* are restricted to Central and South America, where they are represented by some twenty-four species, ranging as far south as Southern Brazil and Paraguay. They are all birds of moderate size, with metallic blue or green colors above, and the breast and abdomen either bright yellow, scarlet, or blood red. The females differ from the males in their duller plumage and the color of the tail; the latter being either chestnut, gray, or blackish, whereas in the males it is as brilliant as the rest of the upper parts,—being either green, blue, or purple. The habits of these trogons seem everywhere to be the same, the birds affecting forest districts, and feeding almost entirely on fruit and berries. They are described as rather stupid, and not even startled by the report of a gun, so that a whole flock may be shot out of the same tree. Most of the species go about in pairs, but are occasionally seen in small flocks, sometimes frequenting the lower branches of trees, but more often the middle and higher levels, where they sit motionless, or utter their curious notes at intervals. Mr. Richmond mentions that when in Nicaragua, a trogon flew into his house, but in most parts of South America these birds are inhabitants only of the virgin forests, extending their range to a considerable altitude on some of the mountains. In Peru, Mr. Stolzmann met with several species, on some of which he has given short notes. The only example of *T. caligatus* obtained during his travels was shot from a considerable height on a tree, when he had heard its cry repeated at intervals for several of hours; it resembled the words *cou-cou-cou-cou-co-co-co-co*, the second half being uttered in a lower tone than the first. Of another kind (*T. melanurus*), his companion, Mr. Jelski, writes that it was not rare, and allowed of an easy approach, flying off to take up another perch in the neighborhood of its previous one, always uttering its note *cou-cou-cou-cou-cou*. Its flight resembles that of a magpie, and the beating of the wings is distinctly heard; from time to time it called *ke-ke-ke*, lowering the tail at the same time, seldom flying more than fifty paces at a time, and preferring the lower branches of the trees. In Costa Rica, Mr. Nutting met with three species of trogons, which seem to differ somewhat in habits. Of the Massena trogon (*T. massena*) he writes: "I have never seen the species associating in flocks as the others do. On the contrary, it seems to be rather a silent bird, preferring the deep recesses of the tropical forests. Its note is a kind of clucking noise, hard to describe, and its native name is *Aula*. In common with all the species of the genus, it seems to be rather a stupid bird, hardly ever taking alarm at the approach of man"; the black-headed trogon (*T. melanocephalus*), very abundant in Costa Rica, being often seen in flocks of a dozen or more, and commonly found in the dry open woods away from water. It has a sort of chattering note, low and soft. In the same situations is also found *T. caligatus*, which is the only species giving utterance to a clear, distinct whistle.

In Africa the trogons are represented by three species belonging to the genus *Hapaloderma*, and characterized by the naked space behind the eye, as also by the color of the tail, which is the same in both sexes, the three central pairs of tail feathers being purplish or greenish, without any black bands at the end of the central ones. The Narina trogon (*H. narina*) ranges from Bogosland in Northeastern Africa throughout East Africa to Natal, extending

as far west as the forests of the Knysna district. On the west coast from Fanti to the Gabun, we meet with Ussher's trogon (*H. constantia*); while in East Africa, from the Zanzibar forest region into Kikuyu, is found the banded trogon (*H. vittatum*).



NARINA TROGON.

Very little has been noted about the habits of these birds, but Mr. Layard states that the Narina trogon is a very shy species, only found in the forest districts. Its food consists of fruit and insects; and its cry is a loud moaning note, *heot*, which has been compared to the bark of a poodle with a cold. This trogon is reported to nest in hollow trees, where it lays four white eggs.

The Indian
Trogons
The Indian trogons, constituting the genus *Harpactes*, are beautifully plumaged birds, distinguished by the bare sides of the face, and

the chestnut tail, barred with black at the tip, of both sexes. The genus is represented by eleven species, some of which measure as much as a foot in length, while all are characterized by their brilliant coloration. One of the best known is the red-headed trogon (*H. erythrocephalus*), characterized by the chestnut breast, the deep crimson head, neck, and under parts, and the black wings, in which the primaries are edged with white, while the wing coverts and inner secondaries are finely vermiculated with white; the gape and region of the eye being bare and of a purplish blue color, while the bill is bluish with a black tip, the feet pinkish, and the eye dull red. The female is not quite so bright in color as the male, the lower parts being duller; the back as well as the neck and breast reddish

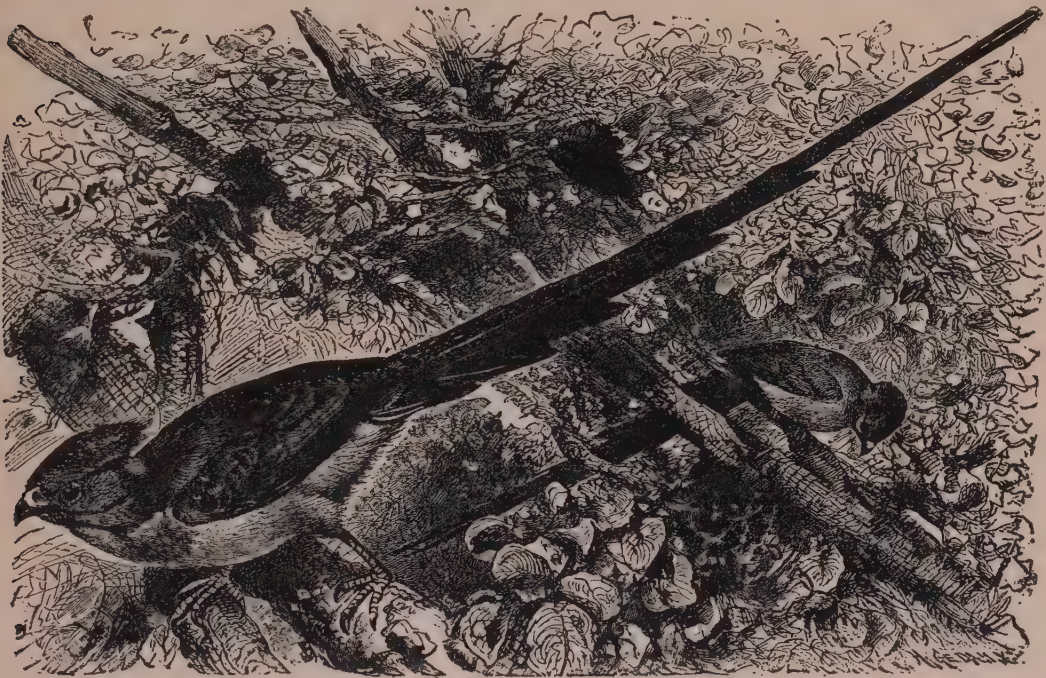
brown, and the vermiculations on the wing coverts buff instead of white. The habits of this trogon differ from those of its American allies, for Mr. Oates says that its food consists entirely of insects, on which it swoops after the manner of a flycatcher.

It affects thick forests, and, although solitary in its habits, is so common in some of the hill forests that a dozen or more may frequently be seen together. The eggs are three or four in number, of a very pale buff color, and laid on the bare wood in some hollow of a decayed tree.

THE COLIES

Family *COLIIDÆ*

The colies bring us to another group of the Picarian order, technically known as the Coraciiformes, often conveniently spoken of (for want of a better name) as the fissirostral group. With the single exception of the humming birds, all the members of the group have a similar arrangement of the tendons on the lower surface of the foot; the first toe being supplied by a branch of one tendon, while the fourth is served by a different one. As a rule, the palate is of the desmognathous



LONG-TAILED COLY OR MOUSE BIRD.

type, although in some cases it is of the modification characterizing the perching birds. The colies themselves are exclusively African, and are remarkable for the structure of their feet, in which all four toes are directed forward, although it is probable that the first can be turned backward at will. The breastbone is characterized by the presence of four notches; the oil gland is naked; the intestine is devoid of blind appendages; and there are ten tail feathers. The whole of the colies are included in the single genus *Colius*, which is represented by half a score of species.

To the colonist of South Africa, colies are commonly known by the name of mouse birds, and are reported to be good eating. They have a rapid flight, like that of a parrot, with very quick beats of the wings, and are generally found in flocks of six or eight individuals, which when disturbed fly off together. Their food generally consists of fruit and berries, occasionally insects being taken, when their other sustenance is scanty.

At the Cape the white-backed coly (*C. capensis*) is not uncommon in gardens during the fruit season, ranging about in small families of from six to eight individuals. They fly with a rapid, though labored flight, generally at a lower level than the object at which they aim, and on nearing it they rise upward with a sudden abrupt curve. They creep about the branches like parrots, and hang, head downward, without inconvenience; indeed, it is said that they invariably sleep in this position, many of them congregated together in a ball. In Natal Mr. Ayres states that the white-backed coly lives entirely on fruits, as does Mr. Andersson, who gives some information as to the flight and nesting habits of the species. The flight, he says, is short and feeble, seldom extending beyond the nearest bush or tree, on reaching which the bird perches on one of the lower branches, and then gradually glides and creeps upward through the foliage, using both bill and feet for that purpose. The nest, which he found in a small bush, was composed externally of grass and twigs, lined internally with soft grass; the eggs were white, and three in number. Another well-known representative of the genus is the South African coly (*C. striatus*), which is brown above with numerous dusky cross-lines on the plumage, the head being crested and a little more ashy, while the forehead and lores are reddish; the sides of the face, throat, and breast ashy brown, the latter with blackish cross-lines; the rest of the under surface being ochrey buff. The total length of the typical form is about fourteen inches, but there is considerable local variation in this respect. Large at the Cape, the bird becomes smaller as it approaches Abyssinia, but is of about the same size in Senegambia, and then gradually decreases in size in its west coast habitats; this variation in size being an invariable rule with African birds. The South African coly breeds in Natal, building its nest in the thick fork of a mimosa or other low tree, well sheltered by creepers and foliage above.

THE HUMMING BIRDS

Family TROCHILIDÆ

Mainly confined to Central and South America, where they range from the steaming tropical forests of Brazil to the cold and barren rocks of Tierra del Fuego, but also extending into Mexico, humming birds are now regarded, in spite of their difference in form and habits, as near allies of the swifts. To a certain extent, indeed, the difference in the two groups is not so strongly marked in the young as in the adult condition, seeing that, while in the full-grown humming bird the beak is always long and slender, in the nestling it is short and wide like that of a swift. In the structure of their palate, according to recent researches, both groups conform to

the passerine type. Having the keel of the breastbone well developed, in accordance with their marvelous power of sustained flight, the humming birds are characterized by the presence of ten feathers in the tail, and the same number of primary quills in the wing; while the secondaries are reduced to six, and are thus very different from those of the perching birds. The three forwardly directed toes are supplied by as many branches of one tendon, while another serves the backwardly directed first toe. The most remarkable peculiarity of the humming birds is in the structure of the tongue, this organ being extensile, with its supporting bones carried backward over the hinder part of the skull.



CHIMBORAZAN HILL STAR.
(Four-fifths natural size.)

Habits

Although adorned with such brilliant metallic colors, the members of this family do not display their tinsel plumage to any great advantage during flight; many observers having remarked how little of the brilliancy of the bird's body is apparent when it is darting through the trees or hovering in front of a flower. This is due to the extremely rapid motions of a humming bird's wing, the beats of which are almost invisible from their rapidity. Professor Newton has well described the impression conveyed by the bird's flight when he writes that "one is admiring the clustering stars of a scarlet *Cordia*, the snowy cornucopias of a *Portlandia*, or some other brilliant and beautiful flower, when between one's eye and the blossoms suddenly appears a small, dark object, suspended, as it

were, between four short black threads, meeting each other in a cross. For an instant it shows in front of the flower; an instant more it steadies itself, and one fancies the space between each pair of threads occupied by a gray film; again, another instant, and, emitting a momentary flash of emerald and sapphire light, it is vanishing, lessening in the distance as it shoots away, to a speck that the eye cannot take note of — and all this so rapidly that the word on one's lips is still unspoken, scarcely the thought in one's mind changed." Mr. Gould, who specially studied the ways of humming birds during his visit to America, says that their flight is unlike that of any bird he had ever seen, and quite different from what he had expected — in fact, exactly the opposite. When poised before any object, the tremulous motion of the wings is so rapid that the eye cannot follow it, and a hazy semicircle of indistinctness on each side of the bird is all that is perceptible. Their actions strongly reminded him of a piece of machinery acted upon by a powerful spring, and although frequent intermissions of rest are taken during the day, the bird may be said to live in the air, — an element in which it performs every kind of evolution with the utmost ease, frequently rising perpendicularly, flying backward, pirouetting or dancing off, as it were. Mr. Gosse observes that humming birds have more or less the habit of pausing in the air and throwing the body into rapid and odd contortions, and he noticed this especially with the long-tailed humming bird, on account of the effect which such motions have on the beautiful long feathers of the tail. He affirms that in these evolutions the birds are engaged in catching insects in the air, and he was close enough to them to see the tiny flies, and to hear the snapping of the bird's bill as it captured them. It will be noticed above that Gould speaks of the capacity of humming birds for flying backward. This power has frequently been doubted, and Mr. Terry observes that "the Duke of Argyll lays it down that no bird can ever fly backward. He mentions the humming bird as appearing to do so, but maintains that in reality it falls rather than flies, when, for instance, it comes out of a tubular flower. But, while watching the motions of a humming bird, it occurred to me to test the dictum of the Duke; and, unless my eyes were altogether at fault, the bird did actually fly backward. It was probing, one after another, the blossoms of a petunia bed, and more than once, when the flower happened to be low down, it plainly rose rather than fell as it backed away from it." Mr. Ridgway likewise says that he has observed the same thing, but he has noticed that the backward motion is greatly assisted by a forward flirt of the expanded tail, as the bird shifts from place to place or from one part of a tree to another, sometimes descending, at others ascending. "It often towers up above the trees," writes the last-named author, "and then shoots off, like a little meteor, at a right angle; at other times it quietly buzzes away among the flowers near the ground; at one moment it is poised over a diminutive weed, at the next it is seen at a distance of forty yards, whither it has vanished with the quickness of thought. During the heat of the day the shady retreats beneath the trees are very frequently visited; in the morning and evening the sunny banks, the verandas, and other exposed situations are more frequently resorted to."

Humming birds, as a rule, do not possess any kind of song, and their few notes are of a twittering character. Mr. F. Stephens, describing the "feeding"

note of Costa's humming bird, says that the female, when feeding, keeps up a pretty constant vocal noise, which somewhat resembles the buzz of the wings, and that the feeding note of the male is finer and not so frequent. "I think," he adds, "that the males are the only ones who sing. The song is sweet and very low, but if it is perfectly quiet around it can be distinctly heard for a distance of ten yards. As might be expected from the size of the bird, it is in a very high key, something like the sound produced by whistling between the teeth, very low, yet at a high pitch. It might be called a warble, and I have heard it kept up for several minutes at a time. On such occasions I have never been able to find a female in the vicinity, and have come to the conclusion that it was sung for the individual's own amusement. There is still another hummer note, — that of the chase. They are very fond of chasing one another, sometimes for sport, often for spite. This note also resembles the feeding note, but is louder and possesses a chippering character, sometimes almost like the sound produced by lightly and rapidly smacking the lips together. I can detect but little difference between the sexes, and it appears much the same whether the chase is in sport or anger. Furthermore, it is often made by the pursued as well as by the pursuer. At such times I am always reminded of a lot of schoolboys playing 'tag.' If a hummer is perched and a person passes near, it starts off, uttering a note similar to that made while feeding; but should it be a female which you have frightened from her nest, she will go off silently." Mr. Ridgway mentions only two other records of the song

of the humming birds, quoting Gosse, to the effect that the tiny *mellisirga* of Jamaica sings, for ten minutes at a time, a sweet but monotonous little song, while



HUMMING BIRD AND NEST.

De Oca has observed a similar fact with regard to the wedge-tailed sabre wing. Mr. Ridgway adds that "although the muffled buzzing or humming noise which has given this family of birds its distinctive name is the sound usually accompanying the flight of humming birds, the males of some species accompany their flight by a most remarkable noise, of an entirely different character." While among the mountains of Utah, in 1869, the writer was for a long time mystified by a shrill screeching noise, something like that produced by a rapidly revolving circular saw when rubbed by a splinter. This noise was evidently in the air, but I could not trace its origin, until I discovered a humming bird passing through the air overhead in a curious undulating kind of flight. I afterwards heard the same sound produced by males of the same species (the broad-tailed humming bird) when they were driving other birds away from the vicinity of their nests. At such times they would ascend almost perpendicularly to a considerable height, and then descend with the quickness of a flash at the object of their animosity, which was, perhaps, more frightened or annoyed at the accompanying noise than by the attack itself. Mr. F. Stephens calls this the "courtship song," but from the circumstance that, in the broad-tailed humming bird at least, it is often produced by solitary individuals while wending their way between distant points, I hardly think that it can be so considered. Mr. Stephens writes of Costa's humming bird that "the female is sitting on a twig in a low bush, not on an exposed twig, as is often the case when she is merely resting; but when the male begins she goes further in, as if she feared that he really intended mischief, while he rises high in the air, and with a headlong swoop comes down, passing her, and, turning with a sharp curve as near her as possible, mounts on high, to repeat the manœuvre again and again. A shrill whistle is heard as he begins to descend, starting low and becoming louder and louder, until, as he passes her, it becomes a shriek, which is plainly audible for a distance of a hundred yards or more. As he mounts again it dies away, only to be repeated at the next descent. This is a common manœuvre with the species, the whistle made during the descent being quite low." The nests are tiny structures, generally made of moss, and covered externally with lichens, which cause them to resemble the surroundings in which they are placed. The eggs are two in number, white, and oval at both ends.

Humming birds are divided into three sections, the characteristics of which are not very trenchantly marked, the fact being that these birds form a very homogeneous group, and thus do not lend themselves to any easily recognizable scheme of classification. The number of species described is nearly five hundred, these being divided into one hundred and twenty-seven genera. In these genera every possible variation of form is perceptible, from the longest to the tiniest bill, the simplest form of tail to the most elaborate of structures, while the metallic plumage, so characteristic of the humming birds in general, is absent in not a few of the genera, and the color of the simplest kind.

The members of this section, as its name implies, are characterized by the serrated cutting edges of the fore part of the upper mandible, the corresponding portion of the lower jaw being in some instances similarly notched. The group comprises upward of five and twenty genera, the

Saw-Beaked
Group

members of which differ infinitely among themselves as regards form and color. The sole representative of its genus, the long-tailed Jamaican humming bird (*Æthurus polytmus*), may be easily recognized by the abnormal conformation of the tail, in which the outermost feather but one on each side is produced to an enormous length. An inhabitant of the island from which it takes its name, its habits have been admirably described by Gosse in the following words: "The long-tail is a permanent resident in Jamaica, and is not uncommonly seen at all seasons and in all situations. It loves to frequent the margins of woods and roadsides, where it sucks the blossoms of the trees, occasionally descending, however, to the low shrubs. There is one locality where it is abundant, the summit of that range of mountains just behind Bluefields, and known as the Bluefields Ridge. Behind the peaks which are visible from the sea, at an elevation of about half a mile, there runs through the dense woods a narrow path, just passable for a horse, overrun with beautiful ferns of many graceful forms, and always damp and cool. The whirring made by the vibrating wings of the male polytmus is a shriller sound than that produced by the female, and indicates its proximity before the eye has detected it. The male almost constantly utters a monotonous, quick *chirk*, both while resting on a twig and while sucking from flower to flower. They do not invariably probe flowers upon the wing; one may frequently observe them thus engaged, when alighted and sitting with closed wings, and often they partially sustain themselves by clinging with the feet to a leaf while sucking, the wings being expanded and vibrating. The humming birds in Jamaica do not confine themselves to any particular season for nidification. In almost every month of the year I have either found, or have had brought to me, the nests of polytmus in occupation. Still, as far as my experience goes, they are most numerous in June, while Mr. Hill considers January as the most normal period. It is not improbable that two broods are reared in a season. In the latter part of February, a friend showed me a nest of this species in a singular situation, but which I afterward found to be quite in accordance with its usual habits. It was at Bognie, situated on the Bluefields mountain, but at some distance from the scene above described. On the twelfth of November, we took, in Bluefields morass, the nest of a polytmus, containing two eggs, one of which had the chick considerably advanced,



JAMAICA HUMMING BIRD.

the other was freshly laid. The nest was placed on a hanging twig of a black mangrove tree, the twig passing perpendicularly through the side, and out at the bottom. It is mainly composed of silk cotton very closely pressed, mixed with the still more glossy cotton asclepias, particularly round the edge,—the seed remaining attached to some of the filaments."

Two species of the curious genus *Microchera* are known to science; the one confined to the mountains of Western Panama, and the other the **White-Crowned Humming Bird** (*M. parvirostris*) taking its place in Nicaragua and Costa Rica. Both are remarkable for their snow-white crowns and tiny dimensions, being only about two and one-half inches in length. According to its describer, Mr. Merrill, the latter is not so persistent in its flight as most of the humming birds, and rests more frequently, this habit being probably induced by the shortness of its wings. The first specimen seen was perched on a twig preening its feathers, and, for a few moments, the observer was doubtful whether such a tiny creature could really be a bird. Another he noticed bathing, and watched its movements for some time before shooting it. "The little creature," he says, "would poise itself about three feet or so above the surface of the water, and then, as quick as thought, would dart downward, so as to dip its head in the placid pool, then up again to its original position, quite as quickly as it had descended. These movements of darting up and down, it would repeat in rapid succession, which produced more than a moderate disturbance on the surface of the water, for such a diminutive creature. After a considerable number of dippings, it alighted on a twig near at hand and commenced pluming its feathers."

The forty-eight genera included under this section are characterized by having the sheath of the upper mandible of the bill very feebly serrated toward the end of the cutting edge. As with the previous section, all kinds of forms are included within its limits, from the lovely hill stars (*Diplogena*) to the duller-colored amazilia. The hill stars, which inhabit the Andes from Equador to Bolivia, are remarkable for their brilliant crown spots, and are among the largest members of the family, extracting the nectar from flowers in a leisurely manner. Stolzmann indeed relates that he has even seen them perched on the dead branch of a tree, flying out into the air, after the manner of a flycatcher. In this division are likewise included the lovely comets (*Sappho*), with their long coppery or red tails and green throats, these birds extending from the interior of Argentina to Chili, Bolivia, and Central Peru.

Forming a genus known as *Lesbia*, these elegant birds are found in the Andes, from Colombia and Venezuela to Bolivia; and are dark green in color, with a short bill, very nearly straight, while they are specially distinguished by their very long, forked tails, in which the feathers are even narrower than in the comets (*Sappho*). Mr. Stolzmann found one of the species (*L. gracilis*) at the height of from seven thousand five hundred to ten thousand feet on the Andes of Peru, where it was apparently migratory, as he noticed it to be common at Tambillo in December and January, whereas in June not one was to be seen. The same naturalist is the rediscoverer of the wonderful *Loddigesia* (mentioned below); and he noticed that the fork-tailed species had a great

antipathy to the racket-tailed *Loddigesia*, which it was always driving away from the flowers. Its voice is quite characteristic, a *tsi-tsi-tsi*, very loudly uttered, and in a descending scale, and on visiting flowers it makes a sort of clapping noise, like that produced by pigeons when striking their wings together over their backs.

**Smooth-
Beaked
Group**

Although resembling the last in their variety of form and coloration, this group differs in the absence of serrations in the cutting edges of the beak. As our first representatives of the group may be noticed the curved-billed hermits (*Eutoxeres*), of which there are four species, all remarkable for the strong curvature of the beak, which describes fully one-third of a circle. The plumage is dull, and devoid of metallic sheen; while the tail is rounded, with the extremities of the feathers pointed. In Peru one of these humming birds (*E. condamini*) has been observed feeding from the flowers of a plant, in which the curved form of the corolla exactly corresponded with the curvature of the bill of the bird, while at the same time the bald patch on the centre of the crown of the latter affords a fair field for the pistils to smear, as the bird probes the flower. The plant in question is abundant on the sides of the paths, and is always covered with plenty of flowers; but although the bird is often met with, it cannot be called plentiful. It stops but a short time on the flower, and is therefore not very easy to procure. In the stomach remains of different species of gnats have been observed. In Salvin's hermit (*E. salvini*), ranging from Costa Rica to Panama, the head is wholly feathered; while the species also differs from the last in having no buff color on the outer tail feathers, which have likewise no white tips; there is also no blue patch on the neck. Mr. Merrill, who met with the species in Panama, writes that "one day, while hunting a short distance from the camp for humming birds, I was startled by the swift approach of a small object through the close thicket, which darted like a rifle bullet past me, with a loud hum and buzzing of wings. Indeed, it was this great noise which accompanied its flight, being so much greater than I had ever heard before from any of these winged meteors of the southern forests, that especially attracted my attention as something uncommon. The bird continued its flight but a short distance beyond the spot where I stood, when it suddenly stopped in its rapid course directly in front of a flower. There for a moment poising itself in this position, it darted upon the flower in a peculiar manner; in fact, the movements of this little creature which now followed were exceeding curious to me. Instead of inserting its beak into the calyx by advancing in a direct line toward the flower, as customary with this class of birds according to my limited observations, this one performed a curvilinear movement, at first stooping downward while it introduced its bill into the calyx, and then, when apparently the beak had reached the desired locality in the flower, its body suddenly dropped downward, so that it seemed as if it were suspended from the flower by its beak. That this was not actually the case, the continued rapid movement of its wings demonstrated beyond a doubt. In this position it remained for the ordinary length of time, and then by performing these movements, in the reverse order and direction, it freed itself from the flower, and afterward proceeded to the adjoining one, when the same operation was repeated. The flower was that of a species of palm, the blossoms of which are attached alternately on either side to a pendent stalk. Each flower resembles an inverted Roman

helmet, and is attached, as it were, by the point of the crest to the stalk. It is a fleshy mass of a deep crimson color, and the cavity of the calyx extends in a tortuous manner downward toward the attachment of the flower to the stalk."

The members of the genus *Phaëthornis* are dull-plumaged birds, of a fair size generally, and remarkable for their wedge-shaped tails, the feathers of which are mostly tipped with white or buff. The bill is long and curved, but not to the same extent as in the last genus. Sixteen species of hermits are known, ranging from Mexico, throughout Central America to Southern Brazil and Bolivia. The nest is an elongated structure, placed at the extremity of one side of long-pointed leaves, as if for protection from the attacks of monkeys and other animals. The hermits are plentifully represented in Brazil, where they inhabit the gloomy forests, feeding chiefly on insects, instead of courting the sunshine and sucking the honey from flowers. Mr. Stolzmann states that in Peru the gray-throated hermit (*P. griseigularis*), instead of inhabiting the hot and moist forests, like the other species of the genus, frequents dry and arid valleys, where it seeks the densest thickets and sometimes banana plantations. While this observer was passing near some thick bushes, he was once arrested by the sound of a very shrill note, repeated at intervals, which struck him at first as the utterance of a



PRETRE'S HERMIT.

tanager, and he searched in vain to find the bird. Baffled, he at last lay down at the bottom of the thicket, and after some minutes discovered a tiny bird perched on a branch quite close to the ground. Here was the meeting place of the hermits, and the observer at length found four or five of these birds seated at a short distance from each other, at intervals uttering their whistle, while sometimes one would take a short flight round, and then hasten back to the same place. Subsequently he heard the birds on several occasions in the same thicket,

uttering their characteristic cry. At another place exactly the same curious habits were observed in an allied species (*P. superciliosus*). Mr. Stolzmann also says that the hermits often come in front of an intruder, and remain suspended in the air, examining him all the time with marked curiosity.

In the single species of the genus *Docimastes* we meet with the most extreme development of bill among the humming birds, since it is here equal to the length of the whole bird, measuring, at least, as much as four inches. The home of this bird is in the Andes, from Venezuela and Colombia to Peru; and the long bill is specially developed to enable

The Sword-
bill Hum-
ming Bird

its owner to extract insects from elongated tubular flowers. In some parts of Peru, visited by the Polish travelers, Jelski and Stolzmann, the swordbill was by no means common, although tubular flowers were met with in abundance, and the bird need fear no rivals, since no others, of its kindred could probe these long tubes. Jelski states that he found the species frequenting a *Jacksonia* with a long red corolla; the bird hovering for a moment before the flower; inserting its beak rapidly, and then withdrawing two or three inches, when it again shot the bill into the same flower, this manœuvre being repeated many times on the same blossom. The bird is also said sometimes to pierce the side of the flower with its lance-like bill to get at the honey within. According to Mr. Salvin, the female has a longer bill than the male, this organ reaching a length of seven inches in the hen bird, whose colors are a little less brilliant than those of her mate.

Rivoli Humming Bird A long straight beak, a forked tail nearly uniform in color, without any white in it, and a brilliant coloration—to wit, a body of bronzy green, a crown of rich metallic violet, a throat of glittering green, and an under surface changing with the light from velvety black to green—are the characteristics distinguishing the single species of the genus *Eugenes*, called after the Duc de Rivoli, first found in the highlands of Guatemala, and extending northward to Mexico and to Southern Arizona. In the first-named country this bird was seen by Mr. Salvin, who writes “that it is a most pugnacious bird. Many a time have I thought to secure a fine male, which I had perhaps been following from tree to tree, and had at last seen quietly perched on a leafless twig, when my deadly intention has been frustrated by one less so in fact, but to all appearances equally so in will. Another humming bird rushes in, knocks the one I covet off his perch, and the two go fighting and screaming away at a pace hardly to be followed by the eye. Another time this flying fight is sustained in mid air, the belligerents mounting higher and higher till the one worsted in battle darts away seeking shelter, followed by the victor, who never relinquishes the pursuit till the vanquished, by doubling and hiding, succeeds in making his escape. These fierce raids are not waged alone between members of the same species. *Eugenes fulgens* attacks with equal ferocity *Amazilia dumerili*, and, animated by no high-souled generosity, scruples not to tilt with the little *Trochilus colubris*. I know of hardly any species which shows itself more brilliantly than this on the wing, yet it is not to the mid-day sun that it exhibits its splendor. When the southerly winds bring clouds and driving mists between the volcanoes of Agua and Fuego, and all is as in a November fog in England, except that the yellow element is wanting, then it is that *Eugenes fulgens* appears in numbers; *Amazilia devillei*, instead of a few scattered birds, is to be seen in every tree, and *Trochilus colubris* in great abundance. Such animation awakes in humming-bird life as would hardly be credited by one who had passed the same spot an hour or two before, and the flying to and fro, the humming of wings, momentary and prolonged combats, and the incessant battle cries seem almost enough to turn the head of a lover of these things.” The nesting of this species in Arizona is described by Mr. Poling, who relates that he was resting under a pine tree, when he heard the noise of a humming bird’s wing close to his head, and on looking up he found a female Rivoli humming bird making perpendicular

dives at him. When he moved away, the bird alighted on a dead twig, and at last, when about fifty feet up the tree, she made a dart for a limb, and there at a distance of ten feet from the trunk was the nest, which was secured only with difficulty.

Two beautiful species alone represent the genus *Topaza*, one being King Humming *T. pella* of Guiana, in which the outer tail feathers are cinnamon; Birds while the second is *T. pyra*, from the Rio Negro and Eastern Ecuador, distinguished by the purplish-black tint of the same feathers. Both species are



GUIANAN KING HUMMING BIRD.
(Three-fourths natural size.)

characterized by the tail feather on each side of the middle pair being elongated, curving outward, and then crossing its fellow, as shown in the illustration.

Hill Stars In the humming birds commonly designated hill stars (*Oreotrochilus*), the beak is relatively short and curved, while the toes are proportionately large, and the tail is squared, with narrow feathers. These birds are inhabitants of the higher Andes from Ecuador to Chili, each species having a

peculiar and restricted range. Thus, *O. pichincha* and *O. chimborazo* occur only in Ecuador, the former being confined to the volcanoes of Pichincha and Cotopaxi, and the latter to that of Chimborazo; *O. adelæ* lives on the Andes of Bolivia, *O. leucopleurus* on those of Chili, while *O. melanogaster* and *O. estellæ* inhabit the Andes of Peru, the latter also occurring on those of Bolivia. The Chimborazan species, of which an illustration is given on p. 1785, is olive green, with the whole of the head, including the crown and the throat, deep glittering violet blue, the rest of the under surface of the body being white, with the middle of the abdomen and flanks blackish brown. Most of these hill stars have a patch of black or chestnut along the abdomen, and the Chimborazan species differs from its ally only in having the centre of the throat green instead of being entirely blue. The pichincha hill star must be a bird which presents many curious features in its economy, if any naturalist could study and write its history, the few notes which have been published about it fully warranting this supposition. Mr. L. Fraser states that he observed this bird clinging to rocks, a habit which, as he justly observes, explains the use of the longer feet and claws. He believes that these birds build their nests under overhanging ledges of rock, and breed in companies, the size of the nest being very large, equaling that of a man's head. The nest itself is comprised of wool, vicuña's hair, moss, and feathers, while at the top of this great mass is a little cup-shaped depression in which the eggs are deposited. One curious nest was found by Professor Jameson of Quito, suspended to a rope hanging from the ceiling of a deserted house. When one side of the nest is lighter than the other, the birds restore the equilibrium by adding a small stone or a square of earth to the other side, so that the eggs run no danger of falling out.

The largest known member of the family is the sole representative of the genus *Patagona*, and attains a length of eight and one-half inches, while the wing measures between five and six inches. This bird is found along the Andes from Chili northward to Ecuador, and is easily recognized by its large size and somewhat sombre coloration; while it is further distinguished by its strong feet, and the white band on the rump, which sharply contrasts with the rest of the plumage of the back. The flight is also peculiar, for although, according to Darwin, the bird hovers over flowers, it does so with a very slow and deliberate movement, quite unlike the vibratory one common to most species. When hovering by a flower, he says, its tail is constantly expanded and shut like a fan, the body being kept in a nearly vertical position; while he further mentions that he never saw any other bird where the force of its wings appeared, as in a butterfly, so powerful in proportion to the weight of its body. Mr. Ridgway adds that the flight of this great humming bird is quite as noiseless as that of a butterfly. In Peru the species is not rare in the ravines, where several may often be met with together. In its flight it presents considerable resemblance to a swift, and only differs in its more subdued motions, though it often glides through the air without a movement of the wings. It visits a certain species of *Jacksonia*, and the head of every specimen is tinged with yellow from this plant. It has also a habit of mounting into the air, beating its wings in a vertical position, and returning to its perch. The only note is a subdued whistle.

Unmistakable on account of its relatively-large tail and conspicuous Racket-Tailed crest, the beautiful and curious racket-tailed humming bird (*Loddi-
Humming gesia mirabilis*) is one of the smallest representatives of the whole
Bird family. In the tail, while the two outermost feathers are long and pointed, the second pair are produced in a wire-like form, crossing each other near the middle of their length, and terminating in a large racket-like expansion of a beautiful purple hue. First described from a single specimen in 1847, the species was not met with again till 1880, when some fine examples were obtained from Mr. Stolzmann. The original specimen came from Upper Amazonia, from the same locality where Stolzmann's examples were obtained. It appears to be confined to the valley of the Utcubamba, a little river on the right of the Marañon system, at an elevation of some eight thousand feet. The country is open, with here and there a little valley more richly clothed with vegetation, while an occasional clump of trees survives, remains of the ancient forest which once was everywhere throughout the region. Dense thickets abound, and a species of *Alstromeria*, of a red color, is its favorite flower, and wherever this occurs the humming bird may be observed, and as it is in flower from August to November, and as another humming bird (*Lesbia gracilis*) does not affect this tree, the present bird thrives. It is one of the most active of the family, seldom taking rest, the females being especially lively. The adult males are more rarely seen than the hens and younger males, but they are beautiful objects when seen in front of the calyx of a flower, the tail with its two rackets being depressed, while the bird is hovering with the spatules in close

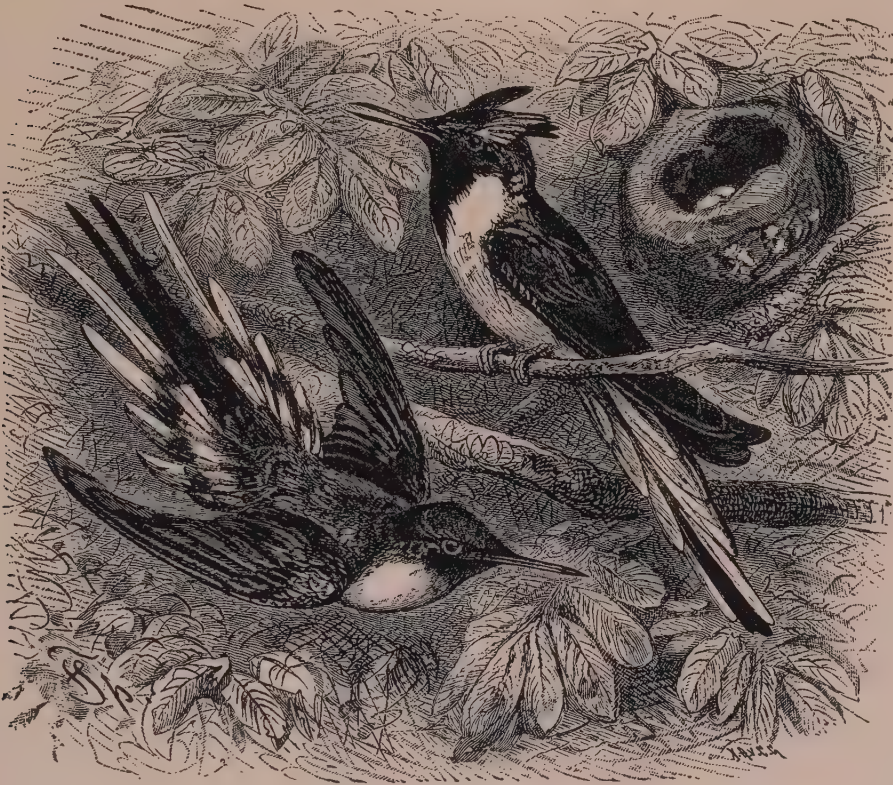


RACKET-TAILED HUMMING BIRD.

proximity to each other. When in flight, the humming noise produced by the wings is great by reason of the short wings of the bird, and is more pronounced in the male than in the female. One of the most curious habits connected with this humming bird is that of assembling. Eight or ten males, mostly young ones, were observed by Stolzmann near Tamiapampa to collect in a bare and desolate plateau on which were no flowers at all, the assembly being apparently merely for manœuvres. Two young males would first stop in the air opposite to one another, with their bodies held vertically, opening their tails and springing first to one side and then to the other,

uttering a little cry each time the tail was opened, which the observer likened to the noise of flipping a finger nail or snapping a watch case. As a rule, this

aërial dance is shared by two young males only, but sometimes several take part in it, and the note of the female bird is almost always to be heard in the vicinity. Sometimes one of the young males hung below a thin branch while another one manœuvred above him, spreading his tail and "snapping." Suddenly in a flash the positions are reversed, and the suspended bird takes the place of the dancer. The old males perform curious antics with the tail, and sometimes actually bring the two rackets close to the crown. Stolzmann has also observed the bird drinking water at a little cascade, of which there are plenty in the country inhabited by the



TUFTED COQUETTE.
(Two-thirds natural size.)

Loddigesia; this being doubtless the only way in which the bird can appease its thirst. The cry of the young male and of the female is a *tsi-tsi-tsi*, rapidly repeated while the bird is visiting flowers or executing the manœuvres described above; when seated they are silent, and the voice of the male has not yet been heard.

This beautiful little species (*Heliactin cornuta*) is distinguished by the glittering tufts over the eyes and wedge-shaped tail, the feathers of which are narrowed at the end into a blunt point. The color is a shining grass green, metallic greenish blue on the crown, and inclining to golden on the back; the tufts at the side of the head being metallic purple,

Double-Crested
Humming
Bird

shading off into golden and then to metallic green; while the sides of the head and throat are black, the under surface of the body pure white, the flanks green, and all but the centre feathers white, with their outer webs grayish. The total length is only four inches. The female is duller in color than the male, and has a green crown, while the sides of the face are dusky, the throat pale buff, and the tail feathers white with a subterminal band of black. The home of this species is in Brazil, where the bird is said to be not uncommon in some portions of the interior, although little is known of its habits.

This is a very easily-recognized group of humming birds by reason of the crested head, and the little spangled frills which are very conspicuous on each side of the neck. Twelve species are known, and the range of the genus extends from Southern Mexico, throughout the greater part of South America to Bolivia and Southern Brazil, but not including Ecuador or Peru. One of the most beautiful species is the tufted coquette (*Lophornis ornatus*), which inhabits the island of Trinidad and the opposite mainland of Venezuela, whence it extends into Guiana. It measures not quite three inches in length, the bill half an inch, and the wing one and six-tenths. The upper surface is of a glittering golden green, with a buffish-white band across the rump; the crest is long and of a dark cinnamon color; the throat is glittering green bordered with cinnamon, and the neck frill is also cinnamon, the feathers tipped with a round spot of glittering green; the abdomen is gray; the sides of the body and under tail coverts shining green, the feathers edged with pale cinnamon; the tail is cinnamon, the lateral feathers broadly, the rest narrowly, edged with golden green externally, and the bill flesh color, with a black tip. Scarcely anything has been recorded of the habits of the coquettes. Of one of the Central-American species (*L. helenæ*) Mr. Salvin writes that its flight is very rapid, and hardly to be followed by the eye as it darts from flower to flower, and its cry is peculiarly shrill, and unlike that of any other humming bird.

THE SWIFTS

Family MICROPODIDÆ*

Allied in some respects to the humming birds, and in others to the goat suckers, the swifts are readily distinguished from the former by their short and wide beak, while from the latter they are differentiated by the palate being constructed after the Passerine type. The short beak is curved toward the tip, and is very broad at the base, so that the gape is of great extent. As in the humming birds, the tail feathers are ten in number; whereas in the swallows, which curiously resemble the swifts in external appearance, there are twelve of these feathers. Of primary quills there are ten, and the secondaries are likewise reduced, their number never exceeding nine. The breastbone resembles that of the humming

*This family is commonly known as the *Cypselidæ*, but as the name *Cypselus* is a synonym of *Microtus*, the latter must be taken as the source of the family name

birds, being free from notches in its hinder border, but the upper wing bone, or humerus, is unique on account of its extreme shortness and width. The swifts may be divided into three subfamilies, the first of which (*Micropodinae*) is represented typically by

The True Swifts In common with two others out of the five genera included in the subfamily, the true swifts have the metatarsus covered with feathers, and the number of joints in the third and fourth toes reduced to three; while the first toe is capable of being turned forward like the others. Among the species the Alpine swift (*Micropus melba*) is of large size. It is of a general mouse-brown color, with rather darker wings and tail; the throat and under surface of the body being white, with slight indications of dusky shaft-hues to the feathers, while there is a broad band of brown across the fore-neck. The length is eight and one-half inches, and the wing also measures the same in length. This swift inhabits the countries bordering the Mediterranean as far north as the Alps, and extending throughout Persia to the Himalayas, but wintering slightly to the southward; while in Africa it is replaced by the allied *M. africanus* extending from Shoa to the Cape. According to Messrs Fatio and Studer, the Alpine swifts arrive in spring, toward the end of March or the beginning of April, and depart at the end of October; although considerable difference takes place in the time of arrival in various years, the backward or forward state of the season appearing to influence the time of their arrival and departure to a considerable degree. In the town of Berne these swifts frequent the tower of the cathedral. A few arrive at the beginning of April, and after a short inspection of their old home disappear. In a few days, however, some few return, and their number is increased day by day until more than two hundred individuals make the cathedral tower their home. When they first come, the swifts are in good condition, and it is well that they are so, as insects are few at that time of year, especially if April happen to be a bad month. At this time they may be seen sitting in rows, hungry and waiting for a more propitious season, and if they should attempt a flight, they circle round the cathedral, without the harsh cries generally uttered during their gambols. Every spring individuals are picked up which have succumbed to the cold, but on the approach of fine weather the cathedral tower becomes the centre of great animation. These swifts are very regular in their habits, at the dawn of day leaving their roosting places to seek their food in mid air, and continuing their flight until about noon, after which they are not seen. They rest until about five or six o'clock, and then recommence the chase until nighttime; sometimes, on warm nights, flying till as late as nine o'clock, and even during the night their cries are loud enough to inconvenience persons living in the neighborhood. Their nests are placed in all kinds of situations in the cathedral, in holes, spouts, or on the arches in the interior; while some of the birds, probably driven away by the inhabitants of the tower, have taken up their abode in a house in one of the most frequented streets of the town. When once on the ground, these swifts, like their congeners, are unable to rise, their long wings and short feet rendering it impossible for them to mount in the air again, though they are able to cling to the rough surfaces of rocks or stones. From this disability the swifts place their nests at a higher level than the point of

exit, so that they are able to fall at once into mid air. For the same reason the materials for the nest are collected from any place except the ground. These consist of hair, wool, dead leaves, etc., and especially fragments of paper, the latter being supplied to the birds by the keeper of the tower, who throws them into the air, when they are seized by the swifts, and carried off to their nests. All the materials are cemented with the birds' saliva to form the nest; and the eggs, although usually two, may be three in number.



COMMON AND ALPINE SWIFTS.
(One-half natural size.)

**Common
Swift**

One of the latest of the summer visitors to Europe, this species (*M. apus*), which is figured on the left side of the above illustration, is almost entirely black in color, the only exception being the white throat. In length it measures about seven inches. Wintering in South Africa and Madagascar, the common swift is represented in the Mediterranean regions by the pale swift (*M. murinus*) which accompanies it in winter to the Cape. Much that has been

written concerning the Alpine swift will apply to the present species; the nesting habits of both being similar. The flight of the common swift is, however, somewhat less rapid than that of its Alpine cousin, although far swifter than that of any other bird frequenting the British Isles. Indeed the manner in which a swift twists and turns in the air is often suggestive of the flight of a bat rather than that of a bird.

Pied Swift

Differing from the true swifts of the Old World by its feathered toes, soft plumage, and nearly square tail, the pied swift (*Aeronautes melanoleucas*), which ranges from the Southwestern United States to Guatemala, constitutes a genus by itself. Writing of its habits, Dr. Shufeldt observes: "On the Chugwater Creek, Wyoming, we passed some very high and imposing chalk cliffs which constitute the more striking and prominent features of the landscape, as the country about them is low and unbroken, being quite prairie-like in character. The head of one of these large chalk bluffs, as it stood out against the clear blue sky and far above me, actually looked, with the cloud of white-throated swifts swarming about it, like some great beehive from which the inhabitants had been suddenly aroused. These birds were far above the range of my fowling piece, though one now and then dipped down with the most inconceivable velocity and in a graceful curve over my head, as if to obtain a better view of me. A snap shot brought down one of these more accommodating individuals, whose curiosity cost his life, and gave me not only a beautiful specimen, but the opportunity to examine in the flesh, for the first time, one of the then rarest birds in American collections. During the past eight years I have only caught glimpses of single specimens of this bird here and there, and sometimes in most unexpected places. Once, far out on the open prairie, in the northwestern part of the United States, a magnificent adult swift of this species shot by me with the velocity of a meteor, his white flank-patches contrasting conspicuously with his black brown body and wings. It was not, however, until I came to Fort Wingate that the opportunity was really afforded me to more intimately study and observe this swift in its favorite haunts; for all through Northwestern New Mexico occur deep, even-walled cañons of rock, to which *M. melanoleucas* resorts to rear its young. Early in the spring of 1885 (April) I found some two dozen pairs of them in just such a cañon about three miles west of Fort Wingate. The walls of this magnificent gorge are of solid rock, being nearly three hundred feet deep in some places, and for the most part roughly perpendicular, though frequently arching over and outward at their summits. It was within the deep and crack-like fissures seen in the walls of the eaves of these latter recesses, away high up on either side of this rocky chasm, that the swift resorted to lay its eggs. So wisely had every pair of these birds chosen the cleft wherein their nests were hidden that all my plans and attempts to secure a set of eggs proved futile.

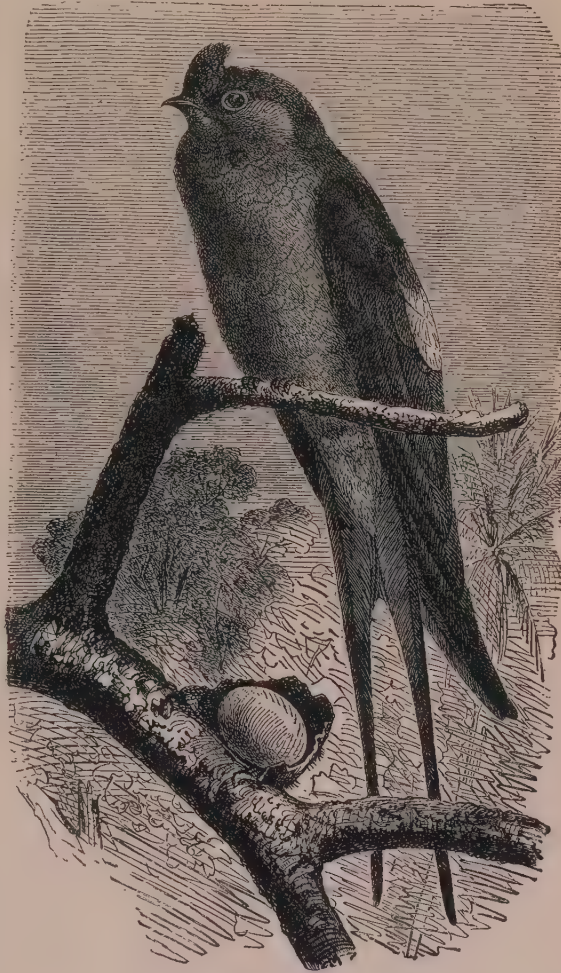
. . . From the extent of their wings the birds of this family appear formed to live in the air, where, in fact, they pass the most of their time, gliding about in extensive circles without effort, and apparently little motion of the wings. This ease of flight stands them in good need in their migratory movements, allowing them readily to pass into warmer climes. During pleasant weather they find their insect prey in the upper air, but when cloudy or rainy we find them skimming the ground

in their pursuit. When on the ground, the shortness and weakness of their legs, added to the length of their wing, incapacitates them from again rising in the air; hence I have several times seen the European species (*M. apus*) picked up in the streets of Geneva, Switzerland, having fallen there during a quarrel with its fellows. When they wish to take rest during the day, which is rare, they always alight on some elevated point, whence they can throw themselves into the air and take to wing. Though numbers were flying about the rocks near Tucson, I heard them utter no note. Sociable among themselves, gathering in large flocks, they never mingle with their nearly related brethren, the swallows. They generally construct their nests in the crevices of rocks or the holes in old buildings; many species have secretory glands, exuding a glutinous substance with which to fasten them firmly. The eggs, from four to six in number, are pure white, and of an elongated form."

Feather-Toed Swifts The two species constituting this genus, although resembling the pied swift in the feathering of the toes, differ in the form of the tail, the outer feathers of which are pointed. The Cayenne species (*Panyptila cayennensis*) ranges through Colombia, Guiana, and Amazonia, while Salvin's swift (*P. sancti-hieromini*) inhabits Gautemala. The latter is an unusually beautiful bird for such a dull-colored family, its general hue being silky black, with a narrow white collar round the hinder part of the neck, while the wings and tail also show a good deal of white at the bases of the feathers. Writing of a nest devoid of eggs, which he found in Gautemala, Mr. Salvin observes that "in this nest we see the saliva of the bird used as an adhesive material in nest building, as in the genus *Collocalia* of the Old World, but differently applied. At first sight the saliva appears to have been used merely to secure the foundation of the nest (if the term may be used inversely) to the overhanging projection of rock upon which the rest of the structure is woven, as in the nests of the *Icteridæ*; but, upon closer examination, it will be seen that the saliva has been applied to secure every one of the seeds used in the construction of the nest, and in no other way could so firm and durable a structure be obtained. Another curious feature will be noticed in this nest, which is the false entrance at the side. I remember to have seen a similar thing in other nests. They appear to be placed there to deceive some enemy, such as a snake or lizard, to the attacks of which the parent bird and its offspring would, during the time of incubation, be more exposed. It would be interesting to know how the materials for the nest were gathered, whether from the plant itself, or caught in the air by the bird as the seeds were carried by the wind."

Edible Swifts The seven small species constituting this genus belong to the second subfamily (*Chaturinæ*), characterized by the elongated wings, and the generally spiny tail, in which the shafts of the feathers are prolonged beyond the barbs so as to resemble needles. The needle-tailed swifts, as the members of the typical genus (*Chatura*) are called, are indeed unrivaled in their rapidity of flight. From the other members of the group the edible swifts differ by the absence of the spiny characteristic in the tail; their chief claim to our interest being their peculiar nests, which form an article of food in the East. Formed chiefly from the birds' saliva, these nests are firmly attached to the walls of caverns. Mr. C. Hose has discovered that the different species of the genus build distinctive nests;

the valuable white nests, which are free from moss, being formed by *Collocalia fuciphaga*. Writing of the habits of this species in Ceylon, Colonel Legge states that the breeding season lasts from March till June, and that the nests form large colonies. Many of these are known, from seeing the birds haunt the vicinity of certain precipitous hills, but few have been visited and examined on account of their general inaccessibility. The narrator then describes his visit to a cave on the twenty-second day of May, when nearly all the nests contained young, two being the average number. "It is noteworthy, that the partially-fledged young, which were procured on this occasion for me, and which I kept for the night, scrambled out on the exterior of the nests, and slept in an upright position with the bill pointing straight up. This is evidently the normal mode of roosting resorted to by this species. The interior of this cave, with its numbers of active tenants, presented a singular appearance. The bottom was filled with a vast deposit of liquid guano, reaching, I was informed, to a depth of thirty feet, and composed of droppings, old nests, and dead young fallen from above, the whole mingled into a loathsome mass with the water lodged in the crevice, and causing an awful stench, which would have been intolerable for a moment even, had not the hundreds of frightened little birds, as they screamed and whirred in and out of the gloomy cave, with a hum like a storm in a ship's rigging, powerfully excited my interest, and produced a long examination of the colony. This guano deposit is a source of considerable profit to the estate, the hospitable manager of which informed us that he had manured one hundred acres of coffee with it during that season."



LONG-WINGED TREE SWIFT
(One-half natural size.)

Tree Swifts

A third subfamily (*Macropteryginæ*) is represented by the five species of the genus *Macropteryx*, which ranges from India, through Burma and the Malayan Archipelago, to the Solomon islands. They present such marked

differences from the rest of the swifts that they have been separated as a distinct family. The plumage is much softer than in the majority of the swifts, and thus shows an approach to that of the goatsuckers. The sexes are different in color, and the young very distinct from the adults; whereas in the other swifts there is very little difference between the plumage of the young and the old birds. The head is generally crested, and some of the species have elongated whisker streaks of white. The metatarsus is shorter than the third toe, which is not the case in other swifts, while the hinder margin of the breastbone has two distinct perforations; in addition to which the nesting habits are quite peculiar. Writing on this subject, Mr. K. Thompson observes that "it is not in the high or deep forest that the bird breeds, but in scattered jungle, usually covering low stony hills and ridges. The nest in this particular case was in a tree quite by itself, with only a few others in the neighborhood scattered about here and there. My attention was directed to the male bird, who was trying his best to dislodge a dove from a tree near to the one on which I ultimately found the nest. I knew that there must be a nest somewhere near, and soon caught sight of the female sitting transversely across a thin dead bough, the tiny nest, glued on to the side of this branch, being, as usual, scarcely perceptible from below. I have seen two other nests of this swift in this neighborhood, each containing a tolerably well-fledged young one. The nests in these instances also were placed on *Boswellia* trees. To the best of my belief they never lay more than one egg in the nest." Mr. Hume adds that "the stem to which the nest was attached is about eight-tenths inch in diameter; against the side of this the nest is glued, so that the upper margin of the nest is on a level with the upper surface of the branch. The nest itself is half of a rather deep saucer, one and seventy-five-hundredths inches in diameter, and about six-tenths in depth internally. The nest is entirely composed of thin flakes of bark, cemented together by the bird's saliva, and is about an eighth of an inch in thickness. The egg is a very elongated oval, obtuse at both ends, and with little or no gloss. It is white, with a slight grayish-blue tinge, and measures ninety-four-hundredths in length by sixty-one-hundredths in breadth."

THE NIGHTJARS

Family CAPRIMULGIDÆ

Like the swifts, these birds, have very wide and gaping mouths; while their plumage is mottled and vermiculated, very much resembling that of the owls, near which group they have been placed in many classifications. Beyond the resemblance of their plumage, and the fact that they are crepuscular birds, coming out to hunt for their prey in the twilight, there is, however, little in common between the two groups; the former being birds of prey, devouring chiefly animal food and laying white eggs, mostly in a concealed position in the hole of a tree; whereas the eggs of the nightjars are laid in the open, and are more or less spotted and marked. The number of both the primary quills and tail feathers in the nightjars is ten, the palate

is of the Passerine (*agithognathous*) type, and the third toe has a comb-like appendage to the claw, similar to that of the herons and barn owls. The group may be divided into the two subfamilies *Caprimulginae* and *Nyctibiinae*, of which the latter contains only the single genus *Nyctibius*, while the former comprises upward of eighteen genera, with ninety-five species.



COMMON AND RED-NECKED NIGHTJARS.
(Two-fifths natural size.)

True Nightjars In common with the rest of their kind, the true nightjars have the broad beak thickly beset with strong bristles of considerable length; while they are specially distinguished by the difference in the sexes; the males having a large patch of white on the quills and at the end of the tail feathers, which are either absent altogether in the females, or are replaced by rufous ones. The nestlings are thickly covered with down, and form an exception to the general rule of young Picarian birds, which are naked when hatched. To this genus belong most of the species of nightjars including the British *Caprimulgus europæus*. They are

found nearly all over the world, inhabiting both Hemispheres, but never going very far north, and the only locality where they appear to be wanting is in some of the Eastern Pacific islands. Of the two European species, the common nightjar shown in the upper figure of cut on p. 1805, is a migrant from Africa, wintering in the Cape, and passing south apparently by the Nile valley and East Africa, as it has not yet been recorded from the west coast. It visits Europe in summer, and breeds throughout the greater portion of the continent, reaching to the latitude of Archangel, and to about 63° north latitude in Scandinavia. The plumage is of a dark, ashy-gray color, closely vermiculated with black; the scapulars are longitudinally streaked with black and ochreous buff; quills with a rufous-buff spot on both webs, the three outer primaries with a large white spot on the inner web; two outer tail



VIRGINIAN NIGHTJAR.

(Three-fifths natural size.)

feathers also with a large white spot at the end of the inner web; under surface ochreous buff, with blackish bars on the abdomen and the under wing and tail coverts; the breast marked like the upper surface of the body, and the throat blackish, narrowly barred with rufous buff, and spotted with white. The total length is ten and one-half inches. The red-necked nightjar (*C. ruficollis*) is a larger bird, measuring twelve inches in length. It has large white spots on the quills and outer tail feathers, but differs in having the hind-neck rufous, forming a broad collar, which has gained the species its familiar name of red necked. It inhabits the countries of Southwestern Europe and Northern Africa, nesting in Spain, Algeria, and Morocco; migrating occasionally into Southern France; and it has even reached Great Britain on one occasion, but its winter quarters are unknown. The food of the nightjar consists entirely of insects, in pursuit of which the bird may be seen

flying over the heather or the fields in the twilight, often, as it flies, producing a clapping noise, apparently by striking its wings together, above its back, like a pigeon. The "churring" note which the birds make is familiar to all dwellers in the country, and hence its name of churn owl, by which it is known in many districts. Waterton has recorded the notes of one of the species in Demerara as represented by the words, *work away! work, work, work away!* Another calls, *who are you? who, who are you?* While another cries mournfully, *willy-come-go! willy, willy, willy-come-go!* and a fourth, the one represented in the preceding figure (*C. virginianus*), tells you to *whip-poor-will! whip-poor-will!* in tones wonderfully clear and startling.



STANDARD-WINGED NIGHTJAR.

(One-half natural size.)

Leona Nightjar The beautiful and rare bird (*Macrodactylus macropterus*) thus named is but seldom obtained in its full perfection of plumage, since the peculiar, long-shaped primary, which forms the distinguishing characteristic of the genus, is often missing or not developed. The male of the Leona nightjar has the ninth primary quill developed to an extraordinary length with the shaft of the feather bare and ending in a racket, so that, as the bird flies, the wing has a long pennant, or streamer, on each side. This is probably only developed in the breeding season, and is not found in the female. The species is only found in Africa,

where it occurs in Western Abyssinia, and on the west coast from Senegambia to the River Niger. Two other members of the genus are known.

As in the preceding genus, this nightjar (*Cosmetornis vexillarius*) has an elongation of the primary quills, of which the seventh and eighth are greatly developed, while the ninth is prolonged into a streamer which floats behind the bird as it flies. The shaft, however, is not bare as in the Leona nightjar, but feathered throughout its whole extent. This bird is an inhabitant of Africa, and its range extends from Equatorial Africa westward to the Benue river and Fernando Po, and south throughout Eastern Africa to the Zambezi and Damaraland. The following account of this nightjar has been published by Sir J. Kirk, who met with it in Nyassaland, and writes that it "was first observed about three hundred miles up the Zambezi, a little above Tete, on the Keihrabassa rapids, in November, 1858, and was there decidedly common. It was again met with on the western side of Lake Nyassa, where in September and October, it was very plentiful, being seen in flocks of from fifteen to twenty. It was also common at Chibisa on the Shiré, in latitude 16° south. It was only during the months from October to January that the singular prolongation of the wing feathers was observed; these are peculiar to the males. Like other nightjars, the habits of these birds are crepuscular. When startled during the daytime from the ground, where they always rest, they fly swiftly for a little distance, and again settle, but are extremely difficult to follow with the eye. Not so with the males in full plumage. In their case there is no difficulty; their flight is evidently retarded, and they become prominent objects from the long streamers waving behind them. A deviation from the usual habits of the bird was observed when cruising on the Nyassa Lake. On two occasions, being overtaken in a gale, and riding out a short but dangerous sea, which set in and raised a surf on the shore, through which it was impossible to land, the male birds came off in flocks of about fifteen and flew over the surface of the water. On no other occasion have I seen them take wing of their own accord, or keep on the wing during the day."

South America is the home of a group of nightjars remarkable for their enormously developed forked tails; while in Africa there is also a genus (*Scotornis*) which has an elongated tail, longer than the body of the bird itself, the feathers gradually decreasing in length till the outside ones are the shortest. In South America, the genus under consideration has the outer tail feathers produced, and the two central ones also, the next pair being the shortest. In *Macropsalis*, however, the outside pair of tail feathers are produced to an enormous length and form a train, the feathers gradually reduced in size toward the middle of the tail, the two centre ones being the shortest. Of the Argentine fork-tailed nightjar (*Hydropsalis furcifera*), Durnford states that it is not uncommon near Buenos Ayres in spring and autumn, living on the ground in damp situations where the grass is long and thick enough to afford some slight cover, and is generally observed in parties of four or five individuals. Its flight is noiseless, and performed by jerky, erratic movements. In Entre Rios, Mr. J. B. Barrows found it common in summer, arriving in August and leaving in May; and he states that "while hunting capivaras and armadillos by moonlight, I had frequently good

opportunities for watching its movements. Its flight is nearly as irregular and as noiseless as that of a butterfly, while its beautiful tail is opened and shut in the same manner as with the scissor-tailed flycatcher. Alighting frequently on the ground, or on stones or roots, it keeps up a continual but very soft clucking, which is the only note uttered. It was most often seen in open grassy or sandy spots in the woods, especially along the margins of the streams. By day it sits close on the ground, and, if disturbed, only flies a few yards, though it evidently sees well." Mr. O. N. Aplin found the eggs of this species in Uruguay; they were of a creamy-pink color, delicately marked with lines and veins of pinkish lilac, something after the manner of bunting's eggs. "On the seventeenth of March," he writes, "I saw a male with the long tail feathers settle on a post of a wire fence which passed through part of the *monté*;* it sat lengthwise to the line of fence. The curious long swallow tail of the male does not seem to incommode it at all, as the bird can turn and twist about in its rapid gliding flight in a wonderful way, and accomplishes the difficult aerial navigation of the thorny *monté* with all the ease and grace of our nightjar in an oak wood."

The single representative of this genus
Nacunda
 Nightjar (*Podager nacunda*) differs from all the preceding, in the slight development of the bristles



ARGENTINE FORK-TAILED NIGHTJAR.
 (One-third natural size.)

* The Argentine term for the small woods surrounding so many of the settlements on the pampas.

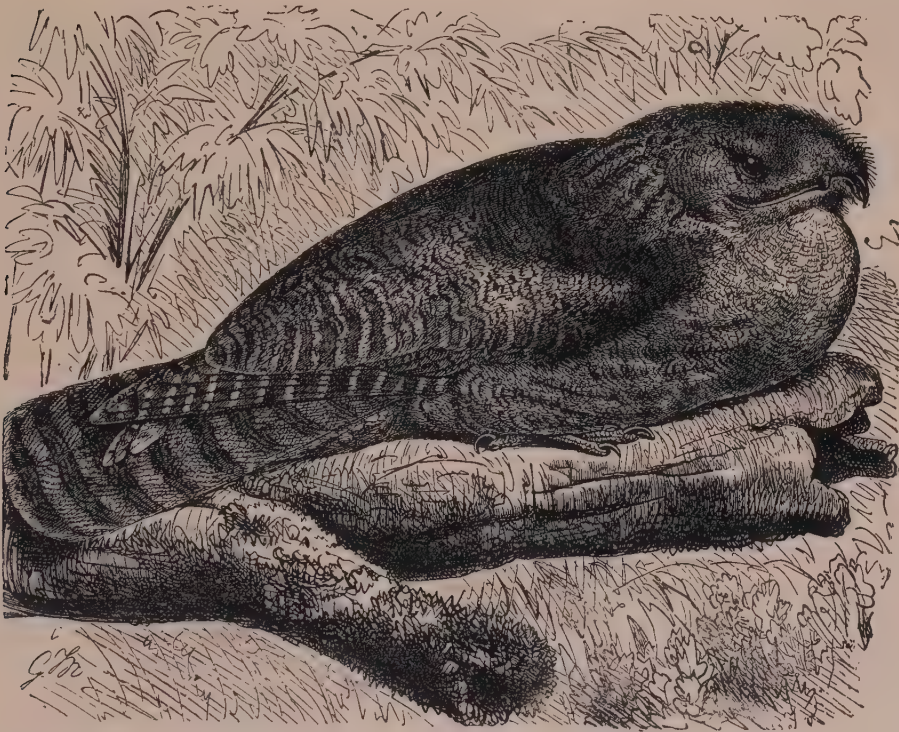
of the gape, as well as by the shortness of the tail, which only equals about half the length of the wing. The general plumage is of the usual mottled hue, but the tail is distinctly barred; while the primary quills are conspicuously white, and the secondaries lighter brown, with blackish brown bars and vermiculations; the central tail feathers being like the back, with broad white tips to the outer ones; the abdomen and under tail coverts white; the lores and upper throat reddish, with blackish brown bars; the chin almost uniform rust color; and the lower throat very dark brown, the breast being similar to the upper parts. The length is eleven and one-half inches. Mr. W. H. Hudson writes that "the specific name of this goat-sucker is from the Guarané word *nācundá*, which Azara tells us is the Indian nickname for any person with a very large mouth. In the Argentine country it has several names, being called *dormibu* (sleepy-head), or *duerme-duerme* (sleep-sleep), also *gallina riega* (blind hen). It is a large handsome bird, and differs from its congeners in being gregarious, and in never perching on trees or entering woods. It is an inhabitant of the open pampas. In Buenos Ayres and also in Paraguay, according to Azara, it is a summer visitor, arriving at the end of September and leaving at the end of February. In the love season the male is sometimes heard uttering a song or call, with notes of a hollow mysterious character; at other times they are absolutely silent, except when disturbed in the daytime, and then each bird, when taking flight, emits the syllable *kuf* in a hollow voice. When flushed, the bird rushes away with a wild, zigzag flight, close to the ground, then suddenly drops like a stone, disappearing at the same moment from sight as effectually as if the earth had swallowed it up, so perfect is the protective resemblance in the coloring of the upper plumage to the ground. In the evening, they begin to fly about earlier than most *Caprimulgi*, hawking after insects like swallows, skimming over the surface of the ground and water with a swift, irregular flight; possibly the habit of sitting in open places, exposed to the full glare of the sun, has made them somewhat less nocturnal than other species that seek the shelter of thick woods or herbage during the hours of light. After the breeding season they are sometimes found in flocks of forty or fifty individuals, and will spend months on the same spot, returning to it in equal numbers every year. One summer a flock of about two hundred individuals frequented a meadow near my house, and one day I observed them rise up very early in the evening and begin soaring about like a troop of swallows preparing to migrate. I watched them for upward of an hour, but they did not scatter as on previous evenings to seek for food; and after a while they began to rise higher and higher, still keeping close together, until they disappeared from sight. Next morning I found that they had gone."

Wood

Nightjars

With these large and mainly South American nightjars we come to the sole representatives of the second subfamily. They are characterized by the plumage being more mottled than in the true nightjars, and the extreme shortness of the metatarsus, which is inferior in length to all the toes, as well as by the absence of the comb on the third toe. Moreover, the sides of the body and breast carry large "powder-down" patches, which do not exist in the typical subfamily. Of these birds there are six species, which range from Mexico to Brazil, and are also represented in Jamaica. The note of these nightjars is

described as being more extraordinary than that of any other bird. Waterton, for instance, writes that, "a goatsucker inhabits Demerara, about the size of an English wood owl, whose voice is so remarkable that, when once heard, it is not easily forgotten. A stranger would never believe it to be the cry of a bird, but would say it was the departing voice of a midnight murdered victim, or the last wailing of poor Niobe for her children, before she was turned to stone. Suppose a person in hopeless sorrow, beginning with a high loud note—*Ha ha! ha ha! ha!*—each note lower and lower till the last is scarcely heard, pausing a moment or



GREAT WOOD NIGHTJAR.
(One-third natural size.)

two between each exclamation, and you will have some idea of the moaning of the great goatsucker of Demerara." Mr. Stolzmann, too, states that in Peru the great wood nightjar (*Nyctibius grandis*) has a curious habit of perching upon dead branches, so as to look like a knot or prolongation of the bough, so that it takes an experienced eye to detect them. "Its cry," he writes, "is one of the most extraordinary of any bird I know, and consists of five notes, descending gradually one-fifth in the scale, and producing an uncanny impression during moonlight nights."

THE TODIES

Family *TODIDÆ*

Curious little green and red birds, commonly known as todies, constitute the family *Todidæ*, all the members of which are included in the single genus *Todus*. They are represented only by five species, four of which respectively inhabit the islands of Cuba, Jamaica, San Domingo, and Porto Rico, while the fifth (*T. pulcherrimus*) has been stated to come from Jamaica, although its real home is still unknown. In these birds the beak is long and flattened, the palate of the desmognathous type, the breastbone has four closed perforations on its hinder border, and the oil gland is tufted; while there are twelve tail feathers, and the first toe is present. The habits of the todies are said to be very much like those of flycatchers, but Mr. Scott states that sometimes they hunt insects in trees and bushes after the manner of the American warblers. He found them to be entirely insect eaters, and no vegetable remains were met with in the stomach of those he has dissected. The todies are becoming rarer in Jamaica, owing to the introduction of the mongoose into the island, as the burrows on which the eggs are laid are very shallow and easily robbed by the animal. Of the Jamaica tody (*T. viridis*) Mr. Taylor writes that it "appears to be very generally dispersed throughout the island, and may even be said to be common in most parts. In all localities that I have visited, whether on the mountains at high elevations or among the woods of the plains, it has appeared equally abundant at all seasons. Banks of ravines and gullies, where the fringing forest is of dense and varied but slender growth, hedges with deep banks, woods and thickets bordering many roadways, and especially the steep, narrow bridle paths that wind up the mountain sides, where the banks are high, may be mentioned as some favored haunts. But of all localities there are few, perhaps, where these birds occur constantly in such numbers, or which offer more perfect situations for nesting, than the gullies before mentioned. Many of these dry water courses that during prolonged rains become transformed into rushing, impassable torrents, are of considerable extent, and their sandy beds may be traced for miles inland. One gully, in particular, where most of my observations on the habits of the todies have been made, has a wide and tortuous course, and banks that vary in places from low, weed-covered mounds to precipitous cliffs of clay, between ten and twenty feet in height. In their choice of a situation for nesting, the birds are somewhat particular, preference being given to low, overhanging, weed-covered banks, where the soil is light and friable. The tunnels are rarely, if ever, in high situations, but, on the contrary, may frequently be found at the sides of the shallow ditches and hollows that are commonly formed in soft soil during heavy rains. I have often surprised the todies at work. In beginning a tunnel, they cling in an awkward manner to the face of the cliff or bank, fluttering their wings frequently, as if for support. So far as I have been able to observe, in digging they appear to employ the beak only, and I once took a tody that had almost the entire half or side of the upper mandible worn away; this, however, was during a period of drought, when all vegetation was

burnt and shriveled, and the earth hard and unyielding. In most cases the whole work of excavation would seem to be performed by the birds, yet I have noticed (in the gullies at least) that those portions of the banks usually selected for nesting are nearly always riddled with holes and cavities of different depths. Whether the birds ever take possession of one of these, or enlarge others to suit their needs, I have not discovered; but such a proceeding would seem highly probable in view of the labor



JAMAICA TODY.
(Natural size.)

which the work of excavation frequently entails. When digging into some of these holes in a search for the true nest of a tody, I often find them in the occupation of strange tenants, such as field mice, lizards, and spiders. The latter, black, repulsive-looking objects, are of common occurrence, especially in the depressions formed by the falling away of stones, etc., so that some little caution is necessary in prosecuting a search for the eggs of the bird. The burrows run horizontally and to a con-

siderable depth, but invariably (so far as my experience goes) turn at right angles at a few inches from the entrance. The tunnel terminates in a somewhat rounded cell, where, upon a little heap or bed of fine soft earth, without any lining whatever, the eggs are laid. These are usually three or four in number, almost globular, glossy, and of a beautiful pearly white, except that, when fresh, the contents impart a delicate pink tinge to the shell. They are, in fact, miniature kingfisher's eggs. The tameness of the tody is well known, but, as Gosse well remarks, this seems rather the tameness of indifference than of confidence. I have accomplished the capture of specimens with a butterfly net at different times with little difficulty, and frequently a tody has permitted so near an approach that I have been tempted to put out my hand in the hope of taking it. The todies keep in pairs, if not constantly, for the greater part of a season at least, and during nidification seem to range over a very circumscribed space. Their food appears to consist exclusively of small insects, which they usually pursue and take after a short flight, returning constantly to the same twig, where they will patiently sit and watch, with head drawn in and beak pointing obliquely upward, the plumage much puffed out; the wings meanwhile being flirled by a continuous, rapid, vibratory movement."

THE MOTMOTS

Family *MOMOTIDÆ*

Exclusively confined to Central and South America, the motmots, of which there are seven genera, are closely allied to the kingfishers and bee-eaters of the Old World; and are by no means unlike the latter in external appearance, most of them having a long tail, with the central feathers produced beyond the others. The first toe is always present; the hinder margin of the breastbone has four notches, which are converted into perforations; and there are no cæca to the intestines. The bill is serrated, its saw-like notches being doubtless of use to the birds when they nip off the webs of their tail feathers. Both in the wild state and in confinement, as soon as the central feathers of the tail begin to grow beyond the line of the others, the birds commence to nibble the web away, leaving a bare shaft for an inch or an inch and a half, with a large racket at the end of the central pair. In one instance, quoted by Mr. Salvin, the two middle tail feathers had not grown symmetrically, one being more developed than the other. The bird was evidently puzzled to find the central feather, which its instinct warned it to nibble, and it began operations on several of the other feathers, until in time the middle one grew out beyond the others, and showed which was the proper one to snip. There are seventeen species of motmots, distributed among seven genera, all of them having long tails, with the exception of *Hylomanes*, which is a bird of small size, recalling the todies in general appearance.

True Motmots As a well-known example of the typical genus, we select the Mexican motmot (*Momotus lessoni*), a species with the general color of the plumage green; this tint including the tail feathers which become blue toward their ex-

tremities, where they are tipped with black. On the crown of the head is a patch of black, bordered with silvery blue, which passes into turquoise blue, with an inclination to purple on the nape; the eyebrows, forehead, and cheeks are likewise black, the latter being ornamented with a band of turquois blue above and below; the under surface is olive brown, becoming greener on the abdomen, and inclining to emerald green on the throat; while on the fore neck is a tuft of black feathers edged with greenish blue. In length this handsome bird measures about fifteen and one-half inches from the beak to the tip of the tail. Writing of its habits, Mr. A. K. Cherrie observes that "the nests are built in the ground, some bank, such as the side of a stream, being selected. The entrance tunnel extends back horizontally sometimes for a distance of six feet. At about half its length there is a sharp bend upward for some six inches, then the course is again horizontal as far as the chamber occupied by the nest. The nest space is twelve or fourteen inches in diameter, being round, and about six inches high, with level floor and ceiling. A few rather coarse dry twigs are strewn over the floor. The eggs I am not acquainted with. Mr. José C. Zeledon, to whom I am indebted for the above notes, also tells me that if one of these nests be opened at about the time the young are ready to leave the nest, it is found to be one of the dirtiest, most foul-smelling places that can be



BRAZILIAN MOTMOT.
(One-half natural size.)

imagined. At the time the young leave the nest, they are able to fly pretty well. They have the same colors as the adults, but the bill is much shorter, more depressed, and the edges without serration. The tail is shorter than the wings, and nearly square. The eyes are sepia brown, not chestnut, as in the old bird. . . . With the first utterances of the notes of the adults, the peculiar jerky motions of the tail commenced. It was most amusing to watch the four birds sitting in a row together, almost motionless, only giving the tail first a jerk to this side, then to that, now up and now down, to see it hold for the space of a minute almost at right angles to the body, and then go with a whisk to the other side, the birds all the time uttering their peculiar cooing notes."

In the single representative of this genus (*Eumomota superciliaris*) the beak is very much flattened, and has a grooved ridge on the culmen with hair-like rictal bristles. The tail is long and exceeds the wing in length, and has a broad racket at the end. The color of the species is grass green, with the mantle cinnamon, the crown grass green with a broad white eyebrow, shading off behind into silvery cobalt; at the base of the cheeks a few spots of silvery blue; the under parts are rusty, inclining to grass green on the fore neck and breast, and to oily green on the sides of the face and throat, in the centre of which is a black streak, bordered on each side with silvery blue feathers. This species, which has a total length of fifteen inches, inhabits Central America from Yucatan to Costa Rica, where these birds are locally known by the name of torovoces. "In the breeding season," writes Mr. R. Owen, "these birds are in full song, if their croaking note may be so termed, and are as noisy and busy then as they are mute and torpid during the rest of the year. I do not know of any sound that will convey a better idea of the note than that produced by the labored respiration occurring after each time the air is exhausted in the lungs by the spasms of the whooping cough. The nest of the torovoz is subterranean, and is usually found in the banks of rivers, or of water courses which empty into them. The excavation is horizontal, and at a distance from the surface, varying with the depth of the barranco or bank in which it is situated. The size of the orifice is sufficient to allow the bare arm to be introduced, the shape being round and regular for three or at most nine feet, where the shaft terminates in a circular chamber about eight inches in diameter and five inches high. In this chamber the eggs, usually four in number are deposited upon the bare soil. The banks of the river which winds through the plain of San Geronimo are full of excavations made by this bird—that is to say, in such places where the soil is light and the bank chops down perpendicularly. It is a simple matter to hit upon those which are inhabited, as the entrance to the abandoned ones will be found perfectly smooth, whereas the mouths of those which contain eggs or young are ploughed up in two parallel furrows made by the old bird when passing in and out. The torovoz is exceedingly tame, and when started from its nest will, perched upon a bough a few yards distant, watch the demolition of its habitation with a degree of attention and fancied security more easily imagined than described."

THE BEE-EATERS

Family *MEROPIDÆ*

The bee-eaters constitute a well-marked group confined to the Old World, their place in America being taken by the motmots and jacamars. They have a long and curved bill, with a well-marked ridge along the culmen; the feet are syndactylous, like those of the kingfishers, with the soles very broad, and the third and



COMMON BEE-EATER.
(Two-fifths natural size.)

fourth toes united almost for their entire length, while the second is joined to the third for its basal joint only. The tail feathers are ten in number, the palate is bridged (desmognathous), and the breastbone has four notches on its hinder margin; while there are also certain other osteological characteristics distinguishing the group, into the consideration of which it would be out of place to enter here. Of the five genera by which the family is represented, two (*Meropogon* and *Nyctior-nis*), both of which are Asiatic, are distinguished by a tuft of overhanging plumes on the breast, which are wanting in the other three. Of the latter, the swallow-

tailed bee-eaters (*Dichrocercus*) and square-tailed bee-eaters (*Melittophagus*) are confined to Africa, while the true bee-eaters (*Merops*) inhabit all the four great continents of the Old World. As a rule, the bee-eaters lay glossy white eggs in a nest situate at the end of a long tunnel excavated by the birds themselves, although the two species of *Nyctiornis* are stated to nest in trees.

Distinguished by the absence of a tuft on the breast and the forked swallow-like tail, in which the central feathers lack the elongation characterizing the other members of the family, the African swallow-tailed bee-eaters (*Dichrocercus*) are represented by two species, one of which (*D. furcatus*) comes from the western side of the continent, while the other (*D. hirundineus*) is a southern form. The latter is distinguished by having the forehead and eyebrow of the same green hue as the rest of the head, instead of being blue; while the general color of the upper parts is golden green; the wings being green, and their primary quills light chestnut with black tips, forming a terminal band to the wing feathers; the upper tail coverts and the central tail feathers are blue, the remainder golden olive tipped with white, before which is a shade of black; a black streak runs along the sides of the head; the cheeks and throat are orange yellow, followed by a black band; the breast is green; the abdomen and under tail coverts blue; the bill black; the feet dusky gray, and the iris crimson. The whole length is eight and five-tenths, that of the wing being three and ninety-five-hundredths, and that of the tail four inches. The sexes are alike in color. This bee-eater inhabits the Cape Colony and South Africa generally, extending on the east as far north as the Zanzibar region, and on the west to Damaraland and Benguela. In habits this species is like the other bee-eaters, hawking for food in the open, and capturing insects in full flight. It seems, however, to fly at a lesser altitude than some of its larger relations, and nests in sandy banks, making a tunnel of about three feet in length, the entrance to the tunnel being very small, not more than two inches wide, but opening out into a slightly-wider chamber at the end.

The square-tailed bee-eaters (*Melittophagus*) are all of small size, measuring only from six to nine inches in length, and mostly confined to Africa, although two species range into India and the countries east of the Bay of Bengal as far as Java. Thirteen in number, these bee-eaters are easily recognized by their square tails; their general coloration being of the peculiar green hue common to the group, although with considerable contrasts of blue and yellow, some also having a black band on the throat. While the African species frequents water courses, the little bee-eater (*M. pusillus*) prefers reedy marshes and swamps, where it perches on low bushes and trees. On the other hand, the white-fronted species (*M. albifrons*) selects higher trees in the neighborhood of water. A well-known member of the genus is the chestnut-headed bee-eater (*M. swinhoei*), in which the lower back and upper tail coverts are silvery blue; the primary quills having their inner surface rufous, with a blue bar at the end; while the tail is greenish blue; the head and mantle chestnut; the throat yellow, with a black band inferiorly; the under surface of the body emerald green; the breast and flanks marked with yellow, and the abdomen and under tail coverts blue. This pretty species is

found in the Indian Peninsula and Ceylon, extending through the Burmese countries to Siam and Cochin China, and southward to the Malay Peninsula. The eggs, like those of the rest of the family, are pure white, and four or six in number; the holes in which they are laid being tunneled in sandy soil by the birds themselves, either in a retired bank of a river or in the sides of a road, and the tunnels varying in length from one foot to seven feet, with the chamber at the end larger than the rest of the excavation. The direction of the passage is not always straight, Davison stating that he has found some of them, after a depth of twelve or eighteen inches, turning off almost at a right angle, while others took an almost circular direction. There is no nest in the chamber, and the eggs are laid on the bare floor of the chamber, which is about six inches in diameter.

Of somewhat larger size than the last, the true bee-eaters (*Merops*) are represented by seventeen species, all distinguished by the central tail feathers being elongated beyond the others. Of these, eight are peculiar to Africa, while two (*M. persicus* and *M. viridis*) inhabit both Africa and India; Arabia owning two species, namely, *M. cyanophrys* from Aden, and *M. muscatensis* from Muscat. In Europe *M. apiaster* is common in summer, *M. philippinus* abounds from the Indian Peninsula to Southern China and even extends over the greater part of Malaysia, while *M. Ornatus* is Australian. Two (*M. bicolor* and *M. sumatranus*) are confined to the Indian region, and one of the handsomest species is *M. breveri* from the Gabun and the Congo in West Africa. The common bee-eater (*M. apiaster*) is a rather large species, measuring ten inches in length, with the wings five and nine-tenths, and the tail four and five-tenths inches. The head and mantle are chestnut; the back and scapulars creamy buff, the lower back washed with blue like the upper tail coverts; the lesser wing coverts are green, but the rest are chestnut like the secondaries, which are tipped with black; the quills are blue with blackish tips; the tail green with blue edges, the central feathers almost entirely blue; the cheeks are blue in front, white behind; the crown chestnut, with a white band on the forehead, followed by a blue line joining a narrow blue eyebrow; the throat is yellow, with a black band across the lower part; the rest of the under surface greenish blue; the bill black; the feet grayish brown, and the iris yellow. The sexes are alike in color, but the young are paler, having a green eyebrow, with the black bar on the lower throat, and show a general wash of green over the head, mantle, and back. This bee-eater visits Southern Europe regularly every summer, and is found as far east as Turkestan, Kashmir, and Sind; breeding in Afghanistan and plentifully in Kashmir. Its habits are like those of other bee-eaters, the bird taking its food on the wing, and being very destructive to bees in certain parts of Southern Europe, visiting the hives and capturing the insects as they fly out and in. In winter it visits all parts of Africa, and is even said to rear a second brood in its winter home. Several species of European birds are, indeed, reported to nest in the southern countries where they winter, but although these records must be received with caution, in the case of the common bee-eater the evidence is certainly remarkable, for Mr. Layard says that not only did he receive information of the breeding of the species, but he himself found it nesting in large numbers on the Berg river in September and October. He observes that "it does

not always select a bank into which to bore the hole destined for its nest, for we found one flat piece of sandy ground perforated with numberless holes, into which the birds were diving and scrambling like so many rats."

In the island of Celebes is found a peculiar species (*Mesopogon Celebean Bee-Eater forsteni*), characterized by having the two central tail feathers elongated, as in the genus *Merops*, but with a bunch of overhanging plumes on the breast. The color of the bird is green; the quills being dusky at the ends, the central tail feathers green; but the rest chestnut with green edges; the head, throat, and breast are deep ultramarine; the hind-neck maroon brown;



BLUE-BEARDED BEE-EATER.
(One-half natural size.)

the abdomen dusky blackish, washed with green, and the under tail coverts chestnut with green margins. The total length is thirteen inches. The species is only found according to Dr. Meyer, in dense forests difficult of access, where it inhabits the highest trees, and has the manners and ways of other bee-eaters.

The Bearded Bee-Eaters The two species constituting the genus *Nyctiornis* are distinguished not only by the tufts of feathers on the breast, but also by the squared tail and densely-feathered nostrils. The blue-bearded bee-eater (*N. ashertoni*) is an Indian bird, extending east to Siam, but replaced in Tenasserim and the Malay region by the scarlet-bearded bee-eater (*N. amicta*), a beautiful species with the long feathers of the throat scarlet instead of blue, and the forehead lilac instead of bluish green. This species is said by Mr. Whitehead to be fairly com-



HOOPoes.

mon in parts of Borneo, frequenting the high forest, where it sits solitary on the lower boughs of trees; making short flights after insects. Although there is one statement as to its eggs having been taken from a tunnel, the blue-bearded bee-eater is believed to nest in holes in trees, having been seen to fly out of such cavities in Tenasserim.

THE HOOPES

Family *UPUPIDÆ*

The beautiful birds known from their cry as hoopoes form, with the wood hoopoes, a group having no very close allies, and are regarded, like each of the last few preceding families, as constituting a suborder by themselves. They have, indeed, been considered as nearly related to the perching birds, from which they are, however, sharply distinguished by the bridged structure of the palate, as well as by the presence of two deep notches in the hinder border of the breastbone. They are further characterized by a perforation in the fore part of the latter bone, which allows the two metacoracoid bones to meet in the middle line; a similar condition obtaining in the bee-eaters and hornbills. Indeed, it is the latter birds, which at first sight appear so different, that seem to be the nearest allies to the hoopoes, both these groups displaying very remarkable nesting habits, and also having certain structural features in common. The whole of the members of the present family are included in the single genus *Upupa*, and are desert-loving birds, inhabiting suitable localities in Africa, the greater part of Asia, and temperate Europe, and specially distinguished by the sandy hue of their plumage, which is devoid of any metallic gloss, the squared form of the tail, and the open and rounded nostrils. They are represented by six species, three of which are exclusively confined to Africa and Madagascar; while the Indian hoopoe (*U. indica*) ranges from the country from which it takes its name to Burma, and on the western limits of its range apparently interbreeds with the common European species.

The latter species (*U. epops*), which is the one represented in our colored plate, has its plumage of a general sandy-brown color, with black and white bands. Conspicuous from the crest of erectile plumes adorning the head, the hoopoe has the secondary quills black with four white bars of equal width; the rump is white; the primary quills are black with a broad band of white; the lesser wing coverts being of the same sandy hue as the back, while the median series is black tipped with buff. The dark vinous crest feathers are tipped with black, bordered inferiorly by a line of white; the flanks have blackish streaks; the under tail coverts are white; the tail is black with a broad white band, somewhat bent downward on the outer feathers; while the beak is black, with a flesh-colored base, and the feet are likewise black. In total length the bird measures about a foot. The range of this species apparently extends from Southern Sweden and Central and Southern Europe generally, to Japan. Its

winter home appears to be in Senegambia, Southeastern Africa, and the peninsula of India. In the latter area it probably intergrades with the resident species, which has no white subterminal bar on the crest feathers, although many intermediate specimens are met with, showing an indication of a more or less perfect white bar, and are doubtless the result of crossing. The sexes of the common hoopoe are alike in color, and the young birds resemble the adults, but have a more fluffy plumage. Breeding as a rule in hollow trees, the hoopoe is now become rare in those parts of the Continent where the country has been denuded of timber. Like the hornbills, the female has the habit of sitting very closely on her eggs, during which period she is fed by her mate. Lord Lilford writes that hoopoes generally "prefer a hole in a hollow ash or willow for nesting in"; but I have seen a nest on the ground under a large stone, others in holes on the sunny side of mud or brick walls, one in a fissure of limestone rock, and one in a small cavern. The eggs when first laid are of a beautiful pale greenish blue, but soon become stained and dirty, so that the average hoopoe's egg is of a dirty yellow color. Swinhoe, again, writing from China, observes that "many years ago a pair of hoopoes took possession of a hole in the city wall at Amoy, near my house. The hen sat close until the young were hatched, the male frequently supplying her with food during the day. Hoopoes have often bred in the holes of exposed Chinese coffins; the natives hence have an objection to them, and brand them as the 'coffin bird.' The young, when hatched, are naked, but soon get covered with small blue quills, which yield the feathers. The little creature has a short bill, and crouches forward, making a hissing noise. It looks a strange compound of the young wryneck and kingfisher. They do not stand upright till nearly fledged. Their crests develop at once, but their bills do not acquire their full length till the following year." A correspondent of Blyth's at Calcutta, who was one of the first to draw attention to the circumstance of the nesting hen being fed by the cock, writes that two pairs of these birds, nesting in his veranda, became so tame that his presence never disturbed them in the least; and he twice saw the males with the females just at the bottom of the steps, and within ten yards of where he was sitting. "I was therefore," he continues, "thoroughly familiar with them, and can assert most positively that for a number of days I never saw the female of either pair out. I did not pay any attention at first to the circumstance of there being only two flying about, until I observed both males going up to the nest with gnats in their bills, giving a call, and then putting their heads inside for the hens to take the food. The feeding times were morning and evening, at regular hours—the former about seven or eight o'clock, and again in the afternoon about four o'clock. I have seen the males getting the gnats, etc., close under the very steps I was sitting on, and almost within two yards of my chair, then flying up, giving a call, and coming down again directly the food was taken. The nests were at opposite ends of the veranda, and only one of the broods came out. I saw some time ago a notice in the *Field*, mentioning the dirty state of the nest, before this could have been caused by the young; and, if my idea is correct, the explanation is simple. I never saw the males go inside the holes in which the nests were, and I never saw either of the

females outside during the time they were hatching, though of course it is possible they may have gone out. If I should live, I will, next spring, observe more carefully; but it was a good while before I noticed the absence of the females this year. Last year I had one nest only in the veranda, and another in the veranda of my office. The hoopoe, I know, breeds in France; and possibly you may be able to find out if any notice of this fact has been taken." And in a second communication he adds: "In continuation of my letter of last year, I may mention that there were again this spring two hoopoe's nests in my veranda, and in the same place. I find that the hens do leave the nest once or twice a day, but I have never seen them stay out longer than to give time to get rid of their droppings, and I have never seen either of them on the ground when out. Generally speaking, they perch on a tree near at hand, and after sitting a few moments for the purpose mentioned, fly back to the nest. Two or three times one of the hens flew out, passed her dropping while on the wing, and returned to the nest without having settled anywhere. They are fed most indefatigably by the cocks, and the number of grubs, small worms, and so forth, destroyed by them is very great." As already mentioned, the name hoopoe is doubtless derived from the note of the bird, rather than from the fact of its possessing a remarkable crest, whence may come the French title, "*la huppe*." Swinhoe writes that the notes are produced "by puffing out the sides of its neck, and hammering on the ground at the production of each note, thereby exhausting the air at the end of the series of three notes, which make up its song. Before it repeats its call it repeats the puffing of the neck, with a slight gurgling noise. When it is able to strike its bill, the sound is the correct *hoo-hoo-hoo*, but when perched on a rope, and only jerking out the song with nods of the head, the notes most resemble the syllables, *hoh-hoh-hoh!*"

THE WOOD HOOPOES

Family *IRRISORIDÆ*

From the members of the preceding family the wood hoopoes are distinguished by the more or less marked metallic gloss on their plumage, the long, wedge-shaped form of the tail, which exceeds the wing in length, and the elongated nostrils, which are partly concealed by an overhanging flap. These birds are represented by three genera, all of which are confined to Africa, and differ from one another merely in the degree of curvature of the beak and the contour of the nostrils. The species which we select as our example of the family is the purple-tailed wood hoopoe (*Irrisor viridis*), which is a bird of considerable size, measuring about fourteen and one-half inches in total length. The color of the upper surface of the plumage is metallic green, somewhat inclining to bronze on the back, and with a steely-blue tinge on the hinder part of the head and neck; while the feathers of the lower portion of the back, as well as the upper tail coverts, are bluish black edged with dark copper. The wings are steel blue, their primary coverts being tipped

with white, while the lesser coverts are edged with copper, and the primary quills crossed with a band of white consisting of twin spots, the outer one smaller than the inner one; the tail is purple, shot with violet, all but the central feathers with an oblique subterminal bar of white; the under surface glossy steel blue; the breast and upper part of the abdomen shining metallic green; the lower abdomen and under tail coverts glossy purplish black; the bill and feet scarlet, and the iris dark hazel. This species is an inhabitant of South Africa, whence it ranges as far north as Angola on the west, and to Mombasa on the east coast. In Northeastern Africa,



PURPLE-TAILED WOOD HOPOE.
(One-third natural size.)

and on the west coast from Senegambia to the Niger, its place is taken by the allied species, *I. erythrorhynchus*, distinguished by having the tail greenish blue instead of purple. In habits all the wood hoopoes are very shy and wary, and very active and erratic in their movements, always frequenting trees, and seldom descending to the ground. They are said to breed in hollow trees and lay white eggs, and the nests have the same offensive smell as those of the ordinary hoopoes. Mr. Ayres says that the birds themselves have a very powerful and disagreeable smell, and he has seen them creeping about the trunks and branches of trees, after the manner of

woodpeckers, and feeding on cockroaches, which they take from the crevices of rough-barked trees. They are generally seen in flocks, probably consisting of family parties, and they have a loud and harsh cry, which has caused the name of kachela or chatterer, to be given to them by the Dutch colonists.

THE HORNBILLS

Family *BUCEROTIDÆ*

The hornbills, which form a suborder as well as a family by themselves, derive their name from the great development of the bill, which is mostly hollow, and furnished with a casque of greater or less prominence, although the latter appendage is sometimes represented merely by a straight and compressed keel. Moreover, in the case of the solid-casqued hornbill (*Rhinoplax*), the whole of this portion of the beak is solid, and the entire skull consequently very heavy, whereas in the other



HEAD OF WEST-AFRICAN TRUMPETER HORNBILL.

(From Sclater, *Proc. Zool. Soc.*, 1871.)

species it is remarkable for its lightness. The palate is of the bridged type, and the upper part of the breastbone has the same perforation as in the hoopoes and bee-eaters. The spinal feather tract is not defined on the neck, and the tendons of the foot are split into branches, of which one leads to the first toe and another to the second, while the third and fourth toes are served by one and the same tendon. The tail feathers, as in most of the Picarian birds, are ten in number. The egg is white, and the young are hatched in a naked and helpless condition. Confined to the Old World, the hornbills are found in Africa and the Indian region, extending through the Malay countries to Celebes, and thence to New Guinea and the western

islands of the Solomon group. They are divisible into three subfamilies, the ground hornbills (*Bucoracinæ*), true hornbills (*Bucerotinæ*), and solid-casqued hornbills (*Rhinoplacinaæ*).

Ground Hornbills These curious and vulture-like hornbills, constituting the first subfamily, are peculiar to Africa, and have a hollow casque, while the back of the neck and middle of the back are both feathered; and the metatarsus is long, even to the extent of twice the length of the middle toe



ABYSSINIAN GROUND HORNBILL.
(One-fifth natural size.)

and claw. The group is represented only by two species, namely, the Abyssinian hornbill (*Bucorax abyssinicus*) from Western and Northeastern Africa, and the South-African hornbill (*B. cafer*) from South Africa, extending on the west to Angola, and on the east to the Pangani river and even as far as the Suk country in Equatoria. These two species differ in the form of the casque, that of the

Abyssinian bird being very evidently open in front, while the South-African species has the casque closed, or nearly so. The Abyssinian form measures upward of three and one-half feet in length, with a wing of twenty-four inches, and has the entire plumage black, excepting the primary quills, which are white. The bill and casque are black, with a red patch on the lower mandible, and the feet are dusky black; while the bare parts of the face are red, with the exception of the naked skin round the eye and on the middle of the throat, which is blue. The female has the bare skin of the throat and region of the eye purple. In Northeastern Africa this hornbill is said to be found in the wooded steppes and on the mountains up to a height of four thousand feet, though more common between one and two thousand feet. After the breeding season they assemble in small flocks, when as many as ten or a dozen are seen together. Of the habits of the South-African ground hornbill more is recorded. Known to the Boers as the *bromvogel*, this species is regarded as a fetich among many of the native tribes, being a rain omen with the Kaffirs, who believe that if one of these hornbills is killed there will be rain for a long time, and who, therefore, in times of drought will throw one of the birds into a vley, in order that rain may follow. Colonel Bowker says that the bird is so offensive that the native idea is that the throwing of its body into the water will "make the river sick," and that "the only way of getting rid of this is to wash it away to the sea, which can only be done by heavy rains and flooding of the river." These hornbills seem to be practically omnivorous, and devour great numbers of beetles, worms, mice, small birds, etc. They generally associate in small companies, and when a snake is discovered, they come round it, each holding a wing stretched out and flapping the reptile with it until it is irritated and seizes hold of the feathers, when all the birds crowd round it and peck it, until it looses its hold,—this manœuvre being repeated till the snake is dead. If the latter advances, the birds fold both wings in front of them, so as to form a shield, thus covering their head and other vulnerable parts. Mr. Ayres says that their call note, *coo-coo*, can be heard at a distance of two miles. The nests are placed in the holes of trees, or in hollows formed by three or four branches striking off from the same spot.

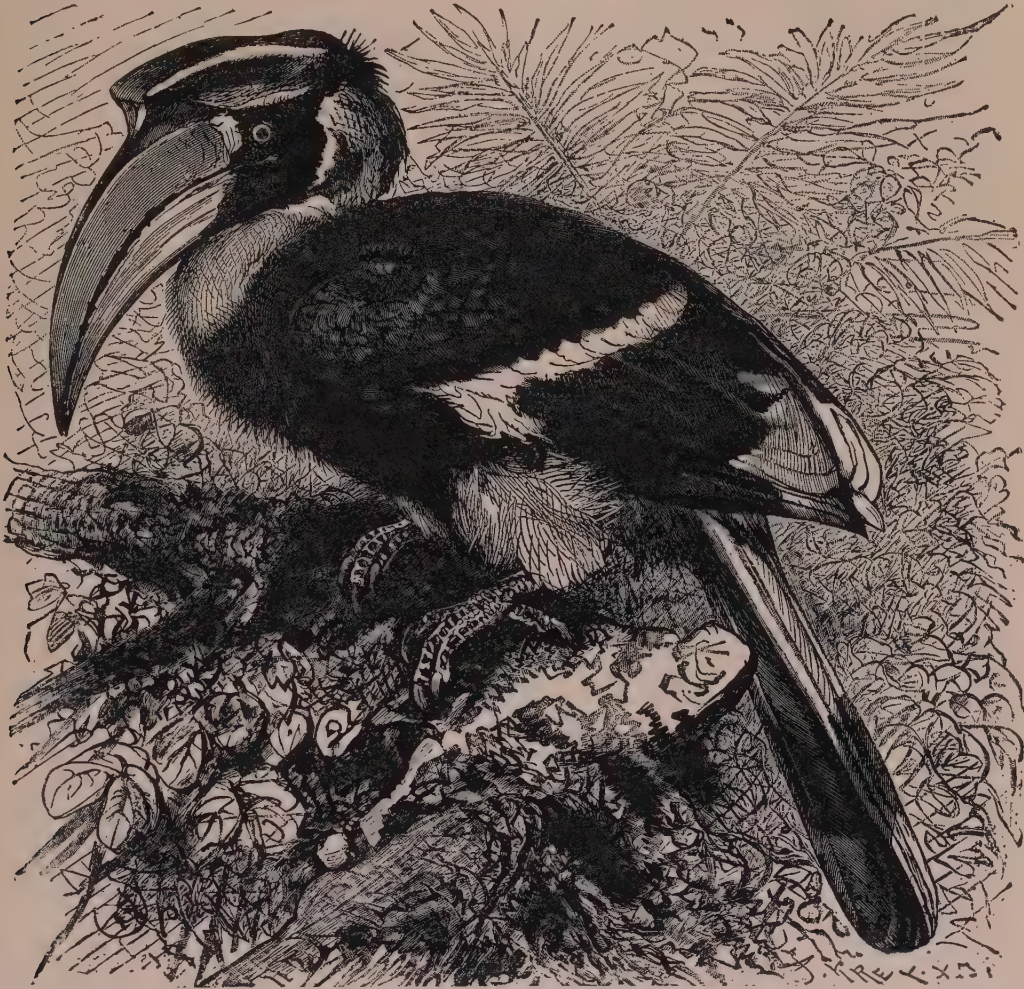
Rhinoceros
Hornbills The rhinoceros hornbills form the typical representatives of the second subfamily *Bucerotinae*, all of which are more arboreal in their habits than the last group, in consequence of which the metatarsus is proportionately shorter, not exceeding the third toe and its claw in length. The subfamily may be divided into two sections, according to the form of the tail. The first section, in which the tail is squared, includes the African trumpeter hornbills (*Bycanistes*), of which the head is figured on p. 1825, the members of the present genus, as well as several smaller forms, such as *Penelopides* of the Philippines and Celebes, and *Lophoceros* of Africa; the latter genus containing the smallest member of the family, measuring only fifteen inches in length. The common rhinoceros hornbill (*Buceros rhinoceros*), inhabiting the Malay Peninsula and the islands of Sumatra and Borneo, is of large size, measuring nearly four feet in length. The color is black, with a slight gloss of steel blue or dark green; the rump and upper tail coverts being white, as is also the tail, which has a broad bar of black just before the tip; while the under surface of the body is black, with the exception

of the lower abdomen, thighs, and under tail coverts. The bill has a large casque, with the fore part turned up into a horn-like protuberance, whence the bird's name of rhinoceros. The color of the bill is whitish yellow, black at the base, the casque lake red, shading off below into orange near the base, which is black; and there is also a black line from the side of the nostrils to the fore part of the casque. The feet are yellowish green, and the iris deep lake. The female resembles the male in color, but has no black base, and no black median line along the side of the casque. In the young birds there is no fully developed casque, but only a small orange-colored excrescence on the top of the upper mandible. In Java another species is found (*B. sylvestris*) with a nearly straight casque. In many places this great bird is kept in a state of semi-domestication, and Mr. Burbridge writing of one which he saw thus kept in Northeastern Borneo, observes that "the rhinoceros hornbill is very often seen in a state of domesticity, enjoying at the same time perfect liberty. When very young they are taken from the nest, and accommodated with a bit of old cloth in a basket as a bed, being fed on rice and soft fruits, until they are strong enough to wander about; they sit on their haunches, wheezing and shrieking all day long, and continually clamoring for food. Their beauty is about equal to that of a very fat badly-plucked goose. If well fed, however, they soon gain strength and assume their plumage, and then they flap about the house and steal or beg for food. At one place where I stayed collecting for some time, a native, in whose house I had established myself, had reared a very fine specimen of this bird. It was the most voracious brute I ever saw. It was omnivorous, and nothing came amiss to it or seemed to disagree with it. It was a fine full-grown male, and a jolly fellow into the bargain. Very often he would descend from a tall camphor-wood tree, which stood a hundred yards or so from the house, in the jungle, to the top of which he was fond of going to sun his wings and clean himself after a meal. When he was very hungry, it was only by tying a string to his leg, and moving him to the side of the house, that he could be prevented from eating off the same plate as myself, or putting his great horned head into the rice dish or curry bowl. Bones of a fowl, curried or not, were gobbled up instantly, and the wonder was to me how he managed to bolt big bones and tough biscuits without choking himself. Whatever was thrown anywhere near his head was sure to fall into his open bill; indeed, I never saw a dog that could catch food in his mouth better; everything was caught on the point of his great bill, and then tossed into the air, being again caught and swallowed; this tossing was always performed. Bones, the entire bodies of small birds from which the skins had been removed for preserving, lumps of bread, biscuits, fruit, fish, or wet rice, shavings, and even nodules of moist earth, all seemed equally welcome, and after taking in a cargo of provisions which would have formed an ample meal for a pig twenty times his own weight, he would 'saw the air' with his great wings, and having gained his favorite perch on the tall camphor tree, would sun himself and plume his wings, and shriek until he became hungry rather than hoarse."

This species (*Dichoceros bicornis*) is the largest of the hornbills, measuring nearly five feet in length, with a great casque concave on the top, and nearly square, rising into well-marked corners on the fore part. The color is black with white bases

Great Pied
Hornbill

and tips to the greater wing coverts and quills; the tail being white with a broad band of black just before the tips of the feathers; while the bill and the casque are yellow, inclining to orange red on the top of the latter, with some black marks at the base of the bill and along the margins of the casque; and the naked skin round the eye is fleshy pink, and the iris blood red. This hornbill, remarkable for its clumsy-looking bill, inhabits the hills of



TWO-HORNED HORNBILL.

Southern India, the Himalayas, and their continuation in the Burmese countries to Siam, ranging southward through Tenasserim and the Malay Peninsula to Sumatra. It is the only representative of its genus; and, as in the other species of giant hornbills, there is a difference in the sexes, displaying itself not in plumage, but in the color of the bill. Thus in the female there is no black on the casque; while the bare skin of the face is reddish, and the eye is white, instead of red. Mr. Hume has published notes on the nesting of the present species, and it is interesting to note

that many observers in India must have discovered the fact of the strange nesting habits of the hornbills previous to Livingstone, who is generally credited with having been the first to draw attention to the incarceration of the female bird during the period of incubation. Colonel Tickell, for instance, writing in 1855 of the nesting of the great pied hornbill in Tenasserim, says: "On my way back to Moulmein from Mooleyit, when halting at Kyik, I heard by the merest chance from the Karen villagers that a large hornbill was sitting on its nest in a tree close to the village, and that for several years past the same pair of birds had resorted to that spot for breeding. I accordingly lost no time in going to the place the next morning, and was shown a hole high up in the trunk of a moderately large, straight tree, branchless for about fifty feet from the ground, in which I was told the female lay concealed. The hole was covered with a thick layer of mud, all but a small space, through which she could thrust the end of her bill, and so receive food from the male. One of the villagers at length ascended with great labor by means of bamboo pegs driven into the trunk, and commenced digging out the clay from the hole. While so employed, the female kept uttering her rattling sonorous cries, and the male remained perched on a neighboring tree, sometimes flying to and fro, and coming close to us. Of him the natives appeared to entertain great dread, saying that he was sure to assault them, and it was with some difficulty that I prevented them from shooting him before they continued their attack on the nest. When the hole was sufficiently enlarged, the man who had ascended thrust in his arm, but was so soundly bitten by the female, whose cries had become perfectly desperate, that he quickly withdrew it, narrowly escaping a tumble from his frail footing. After wrapping his hands in some folds of cloth, he succeeded with some trouble in extracting the bird, a miserable looking object enough, wasted and dirty. She was handed down and let loose on the ground, where she hopped about, unable to fly, and menacing the bystanders with her bill, and at length ascended a small tree, where she remained, being too stiff to use her wings. At the bottom of the hole, nearly three feet from the orifice, was a solitary egg, resting upon mud, fragments of bark, and feathers." The number of eggs laid by hornbills seems to vary, sometimes only one being met with, while at other times four or even five are found in the nest; the present species, apparently, never laying more than four. The female seems to assist in the matting in of the nest hole, using leaf mold and earth, mixed with her own droppings and various decaying vegetable substances, so that the nests are often filthy and give forth an intolerable stench. In all probability the real reason for the retirement of the female hornbill into the recess of a tree is that the bird is about to molt, and that this process is completed while concealed in the tree. Thus the emaciated condition of some of the birds, when liberated, could be accounted for, while their subsequent fat condition and good plumage would be the result of the completed molt. The hole is doubtless plastered up as a defense against enemies, of which the hornbills have plenty. The formidable bill of the bird is useful as a weapon of defense, as well as being of the needful shape to serve as a trowel for plastering up the hole of the tree.

The wedge-tailed hornbills, as the members of the second section of the typical subfamily are collectively termed, comprise several genera distinguished from the

Wedge-Tailed first section by the elongation of the central pair of feathers in the tail.
 Hornbills In the case of the genus *Berenicornis* of Malaysia, as well as in the West African *Ortholophus*, the tail is very much elongated, and forms a graceful appendage of graduated feathers, which have conspicuous white tips. To this section of the hornbills belong the members of the genus *Lophoceros*, which is peculiar to Africa, and contains seventeen species. They are all small birds, com-



YELLOW-BILLED HORNBILL.

pared with the general run of the species of *Bucerotidæ*, and their mode of life seems to be somewhat different from those of the big hornbills of the east, though they have the some habit of plastering up the female in a tree at the season of incubation. They are often found on the ground, and feed on berries, seeds, and insects; Mr. Andersson stating that he has found considerable quantities of sand in their stomachs, picked up by the birds when on the ground. Of the yellow-billed hornbill (*L. melanoleucas*) the above-named naturalist remarks that it "is the most common of the hornbills in the middle of the southern parts of Damaraland. It is

found singly or in pairs, and, being a comparatively fearless bird, is easily killed, especially during the heat of the day, when it invariably perches on or near the top of a lofty tree (where such are to be found), and will remain for hours in this situation, keeping up, with short intermissions, a kind of subdued chattering note of *tõe tõe tõe tõe tõe tõe tõe tõe tõe*, in a tone not unlike the quick yelping of young puppies, and accompanied at intervals by a flapping and raising of the wings and an alternate lowering and erecting of the head." The yellow-billed hornbill is about twenty-one inches in length and has a tail about nine inches long. It is easily distinguished by its yellow bill and by the feathers on the chest being white edged with black. It is found all over South Africa. Another species of *Lophoceros*, namely the South-African gray hornbill (*L. ephrinus*), is easily recognized by the pale buff line down the centre of the back, and by having white shafts to the central pair of tail feathers; the head and neck are gray, with a broad white eye-brow; the beak is brown, and the quills are tipped with white; the under surface of the body is white, with the chest brownish gray. Length twenty inches; wing nine inches. This species, Mr. Ayres says, is a great fruit eater, and lives in small companies. He states that he was once much surprised to hear one of these birds, perched on the top of a small tree, singing very prettily with the voice of a thrush. "I could scarcely believe my ears," he observes, "until I had watched the bird for a considerable time; at last he flew away, and the woods were silent." Mr. Anderson says that he has found this hornbill in Damaraland and the lake regions of Southwestern Africa. It is seen in small families, rarely exceeding six in number. "In common with the rest of the genus it appears to suffer very much from the heat during the most trying season of the year, when it may be found perched at noon in the shadiest part of the forest, gasping as if for breath. When on the wing this species occasionally utters short, piercing cries."

With regard to the Malayan wedge-tailed hornbill (*Anorhinus galeritus*) a curious experience is related by Mr. Whitehead, who found a nest of the species in Northern Borneo. He shot three of the birds before he became aware that there was a nest hole in the tree, but on being assured of the fact, he sent one of his boys to climb up and let the old female out. When the native went to do this, he found two or three birds engaged in feeding her and her young one. Mr. Whitehead says that the hole is firmly fastened up with gutta, dirt, and various gums, and the same hole is frequently used, judging by the heaps of excrement at the foot of the tree. He also considers that the plastering of the hole is necessary to protect the helpless birds against the attacks of monkeys, and the huge tree-climbing monitor lizards, which cause immense destruction among the feathered population of the forests.

Solid-Billed Hornbills In marked contrast to the light and cell-filled casques of the other members of the family, the beak of the solid-billed hornbill (*Rhinoplax vigil*) has, as already mentioned, a perfectly solid casque; on which account this bird is referred to a separate subfamily. In this species the beak has the consistence and appearance of ivory, and is indeed carved by the Chinese in the same way. The species in question is an inhabitant of Southern Tenasserim, the Malayan Peninsula, and the islands of Sumatra and Borneo. In addition to its solid bill, it is remarkable for having the whole of the throat and back of the neck,

bare. The length of the bird is nearly five and one-half feet, the tail alone being almost three feet long. The general color is brown, the quills black with white tips, and the tail brown tipped with white, the tips being preceded by a black band. The two central feathers are more than double the length of the next pair, and the outer pair are entirely white. The under surface of the body is white, the breast being brown, the bill yellow, with the posterior portion red, like the bare throat and neck while the feet and iris are also red. Davison, who found this species in Southern Tenasserim, where he procured a single specimen after much trouble in the evergreen forests of Bankasori and Malwun, says that it is very shy, which is not to be wondered at, since, whenever one appears near a village, every one who can shoot or can get hold of a gun is sure to try and kill it, as the heads are in great demand for carving into love charms, bringing as much as fifty rupees. "The birds," he writes, "confine themselves almost exclusively to the evergreen forests, where they frequent the very highest trees. Their note is very peculiar, and can be heard at the distance of a mile or more. It commences with a series of whoops, uttered at intervals of about half a minute for five or ten minutes; then the interval between each whoop grows shorter and shorter, till the *whoop whoop whoop* is repeated very quickly ten or a dozen times, the bird ending up by going into a harsh, quacking laugh. Then there is a pause of ten minutes, or a quarter of an hour or more, and then it recommences. It chiefly utters this call in the morning and evening, but occasionally also during the day. It never seems to descend to the ground, and it feeds on fruit."

THE KINGFISHERS

Family *ALCEDINIDÆ*

It is scarcely possible to name a country in the world where kingfishers of some sort or another are not found. Although they vary greatly in form and habits, as a rule they have a long and somewhat pointed bill, but the shape of this organ varies considerably in form, according as the bird is a fish catcher or a devourer of reptiles and other food than fish. The structure of the foot, however, scarcely changes throughout the group, for every kingfisher is flat-soled and has an anisodactyle foot, with the toes for the most part united together, so that the foot of these birds is by no means unlike that of a hornbill, to which group some of the larger kingfishers make an approach in general appearance. Unlike so many of the Picarian birds, most kingfishers have twelve tail feathers instead of ten, though a few possess the ordinary Picarian number. As in the hornbills and rollers, the deep plantar tendons of the foot are peculiar, the tendon which usually supplies the first toe not serving that function in these three families, for the toe in question is connected with the tendon which usually works the three front toes. The eggs of the kingfishers are always laid in the hole of a bank of some kind, or a tree, and are glossy white; while the young birds, when hatched, are naked and helpless, although in a little while they become covered with feathers, each of

which is inclosed in a sheath, thus giving the nestling a peculiar bristly appearance. This sheath incloses the feather till it is almost fully grown, and then falls off rapidly, leaving the feathers exposed; although in all kingfishers and their allies the plumage is never very dense. Indeed, in birds which have to plunge into the water a fluffy plumage would be greatly in the way, and hence we have in the kingfishers a closely-fitting body plumage, which does not get dragged or wet through by the immersion which it has to undergo.



THE KINGFISHER.
(Two-thirds natural size.)

In 1871 the writer divided the kingfishers into two subfamilies, namely, the fish-eating *Alcedininae*, and the insect or reptile-eating *Daceloninae*; and even now the kingfishers seem still to afford an illustration of the utility of considering the habits of the birds as of primary importance. In this instance characteristics may be found which can be correlated with the difference in the mode of life. Thus the fish-eating kingfishers are equipped for their manner of living by the development of a long and narrow bill, and a tail just long enough to act as a rudder, but not of sufficient length to be in the way. On the other hand, the bush kingfishers, which feed less on fish and more on insects and reptiles, have the bill not so narrow or

compressed, but more flattened, and in some instances even hooked. Then, again, whereas in the typical subfamily there is almost always a perceptible groove along the bill, leaving the upper part of it in the form of a ridge, in the second group the ridge of the bill is either rounded or flattened, and in one or two instances there is even a groove along the middle of its upper surface.

This subfamily includes five genera, the members of all of which are essentially fish catchers, although on occasion they will eat small insects and crustaceans as well as other kinds of food. Two of the genera, *viz.*, *Pelargopsis* and *Ceryle*, although their representatives are thoroughly piscivorous, have long tails, exceeding the length of the wings; but in the other three, *viz.*, *Alcedo*, *Corythornis*, and *Alcyon*, the tail is conspicuously shorter than the wings. The stork-billed kingfishers inhabit the Oriental region, and differ from the species of *Ceryle*, the only other fish-eating genus with a long tail, in having the sexes alike in color, the bill very sharp and pointed, and the base of the upper edge or culmen flattened and somewhat ridged, instead of being round and smooth. The species of this genus are further characterized by their bright blue backs, thus resembling those of the under-mentioned *Halcyon*, whereas in *Ceryle* there is no bright blue color. Of the stork-billed kingfishers eleven species are known, their range extending from the Indian Peninsula and Ceylon, through the Burmese and Malayan countries to Java, Sumatra, the Philippines, Borneo, and Celebes. The species which inhabits the last island differs from all the others in having a black bill, whereas in the rest it is coral red. One of the best-known species is the Indian stork-billed kingfisher (*P. gurial*), which is a large bird, measuring fourteen inches in length, with a wing of nearly six and a half inches. The general color of the plumage is dull green, with a slight shade of blue on the wing coverts, the outer aspect of the quills and the tail being greenish blue; the head and nape are dark chocolate brown; round the hind neck is a collar of pale ochre, and the under surface of the body is of the latter color; while the bill and feet are dull red. This species is an inhabitant of Ceylon and the greater part of the Indian Peninsula, but it does not reach the northwestern provinces, though extending along the Lower Himalayas and the Terai country as far as Masuri and the Dun. Eastward it ranges to Assam, but is replaced to the south by the Burmese short-billed kingfisher (*P. burmanica*). Generally found along rivers, streams, and back-waters, but only where tolerably shaded by trees, it sits on a branch overhanging the water, and pounces on fish, crabs, and occasionally frogs. Mr. Stuart Baker writes that "this kingfisher is by no means common in the Kachar district, so that I have been able to make but few observations on its breeding and other habits. Personally I have only taken two nests. One of these was placed in a hole about two and a half feet deep, and so large that without much difficulty I was able to put my arm into it and search for the contents. The other burrow was fully four feet deep, and the diameter at the entrance about three and three-fourths inches. Both nests were placed in high sandy banks of the Diyung river, upon which and the Jatinga the species is most often met with. The first hole contained four young birds, and the second a single egg. The latter seemed to be rather abnormal in shape, and was smaller at one end than the other. I have never seen the bird fishing on small

streams, but it is by no means unusual to find it perched on trees at some distance from water, and it occasionally haunts ravines and other insect-producing places, where there is no water at all. Fish, I believe, form the staple article of its diet, but it varies this with any living thing which is small enough. It is on record that it devours lizards and similar small reptiles, and it is not averse to taking young birds from their nests. Of this latter propensity I myself have been a witness. In Rungpore, in the collector's compound, there stands, or stood some years ago, a large tree full of crevices and holes, and much used as a nesting place by many mynas and other birds. One morning I was passing under this tree, when I was attracted by the loud shrieking of a *Pelargopsis*, accompanied by the cries of many other birds. The most vehement and excited among these last were a pair of mynas, whose newly hatched brood were in a large hollow in a big limb some forty feet from the ground, and this had evidently attracted the attention of the blood-thirsty kingfisher. For some time he sat on a branch close to the nest hole, giving vent every now and then to his loud cries, but taking no notice of the small birds which came half-heartedly close to him, with the evident wish, but not the pluck, to attack him. Finally, in spite of the frantic shrieks of the parent birds, who ultimately approached quite close to the kingfisher, the latter made a dive into the hollow, and when he came out of it in his powerful beak there struggled a callow young myna. Seating himself comfortably on a branch, he proceeded to swallow it in just the same manner as he would have done a fish, and it may have been the necessity of getting into position before he swallowed his prey which prevented him from completing his meal inside the cramped hollow of the tree. At all events, his action was the saving of the other young birds, for the mynas, rendered furious by the disappearance of one of the youngsters down the throat of the kingfisher, summoned up courage to attack him in earnest, whereupon he quickly decamped."

Pied
Kingfishers To the members of this genus it is almost impossible to assign a collective English name; for whereas in the Old World they are pied, their transatlantic cousins are either gray or green. The genus comprises a small assemblage of long-billed and long-tailed kingfishers of fish-catching habits; few of which are such strongly built birds as their short-beaked allies, although some of the Oriental forms are nearly their equals in size. Their great distinctive feature is that the sexes differ in color or markings; this difference generally displaying itself by the presence in either the male or the female of an additional band on the breast. Seventeen species of these kingfishers are known, twelve of which are American. In color, most of the latter are glossy green, but four are gray; the best-known species being the belted kingfisher (*Ceryle alcyon*) of North America. In the Old World all the species of the genus are either black and white, or gray and white. One of the largest species is the great pied kingfisher (*C. lugubris*) from the Himalayas and the mountains to the eastward of that chain throughout China to Japan. The head is crested, the crest feathers being black with white spots, and there is a tuft of white feathers in the centre of the crown, while the rest of the upper surface is banded with gray and white; round the hind neck runs a broad white collar; the under surface of the body is white,

with a chest band of black and white feathers, and the sides of the body are also barred with black. The female is like the male in color, but does not show the tinge of rufous on the cheeks and breast band which are to be seen in the male. The under wing coverts and axillaries are pale rufous, thus showing the sexual differences which are one of the characteristics of the genus. Writing of a nest with young found in the Northwestern Himalayas, Mr. Hume states that "the entrance was a large hole, fully four inches in diameter, and at the end was a chamber fully ten inches across, in which were four young birds; in the chamber was a quantity of fish bones and some grass. The eggs are three or four in number, and the birds are in the habit of carrying to their young fishes from six to seven inches in length, and these are always swallowed whole." Mr. Stuart Baker writes that "I have seen but three nests of this bird. The first nest taken was found in July, and was placed at the end of a short tunnel in a bank of one of the biggest rivers in North Kachar, the Diyung. The burrow itself was about two feet long and the egg chamber was over seventeen inches long by nearly ten broad, the height being almost as much. The eggs, of which there were four, reposed on a quantity of malodorous fish bones, these extending nearly a couple of inches up the sides of the walls and partially burying the eggs, so this unpleasant material must have been added after the eggs were laid. The soil in which these were found was loose and sandy. The second nest was found by a Naga in a small stream called the Mahor, running between thickly-wooded banks, nowhere much over fifty yards from bank to bank, and, where the nest was taken, under thirty yards across. This nest was in dimensions much the same as that already described, the entrance tunnel being a few inches shorter. The fish bones also were not so abundant in the nest, doubtless owing to its being newer, as the eggs when found were quite fresh, whereas in the last they were very hard set, indeed almost on the point of hatching. This hole was made in a rather harder soil than the other, but still not in a clay or really stiff material. The only other nest I have seen was found on the tenth of April, 1893, the day before this was written. The female bird I shot as it left the nest, and the male as it came up calling loudly to its mate. The burrow, chamber and all, was complete when found, but was quite empty, containing neither eggs nor nest. The tunnel in this case was not six inches long, and the chamber was about fifteen inches long by about seven broad and six high. The soil in which this nest hole was excavated was composed of clay and sand mixed, and was decidedly stiff. Judging from the three nests above described, it seems probable that the bird only makes very short burrows. *Halcyon smyrnensis*, *Alcedo ispida*, and many other kinds of kingfishers, would have dug out a hole some four to six feet deep in the ground in which the first nest was taken, and would certainly have made them of over three feet in the other places. In texture and shape the eggs do not differ from the majority of other kingfishers' eggs, although they are unusually small in size. Amongst the bed of bones found in the first and second burrows, there were a good many which must have belonged to fish fully six inches long, but the greater number of them were those of very small fish. The Kacharis tell me that as a rule this bird only lays two or three eggs, and that my finding four was exceptional, but a Kachari's word is not particularly reliable. They are also said to breed principally in May,

after the first heavy floods, not, as nearly all other birds which make similar excavations for their eggs do, before the floods. This kingfisher is very common on nearly all the hill streams of any size, up to about two thousand feet; above this it is much less common, but I have seen it now and then on the Laisung, a little stream at an elevation of about three thousand feet. During the breeding season it ascends higher up than in the cold weather, during which latter season it is often found well into the plains, but after April I have not heard of any being met with below about five or six hundred feet. On the Drying Kopili and Zelinga rivers this bird and *C. rudis* meet one another, and for a few miles at their junction both may be met with, but their limits seem to be very distinctly defined, and a straggler of either kind is but seldom met with far beyond them. I believe they are entirely fish eaters. I have never seen them except on fair-sized streams, and the stomachs of those I have examined contained nothing but fish. While waiting for fish, they perch very low down amongst the scrubby bushes bordering the streams, or else on some overhanging bamboo, but whatever the position selected, it seems nearly always to be one well in shadow, and, instead of sitting on some outside twig or bough, they choose one well inside or under the bush or bamboo clump. In the same manner their love of shade and darkness leads them always to select the shady side of the stream, whenever practicable. As a rule, they are to be found in pairs, seldom singly, for, though the male and female may be some distance apart, they keep within hailing distance of one another. They do not as a rule fly at all fast or far at a time, unless frightened, but on such occasions are capable of flying extremely fast and powerfully, rising high in the air, well out of gunshot, to avoid any danger, and then dropping again when past it, continuing their flight low down close to the water. Their manner of taking prey from the water is by swooping down obliquely toward it, after which they move further on, seldom returning to their original perch. Occasionally, as they fly along and are attracted by something in the water below them, they will hover momentarily, after the manner of *C. rudis*, and then drop perpendicularly down into it; in these cases, however, they seldom dive to any depth, and do not immerse more than their head and shoulders. The usual cry is much like the typical cry of the family, but is very loud, and generally uttered in a quick succession of notes. Besides this cry, it gives a low hoarse croak from time to time when seated in the shadow, which same note is, I think, merely a call to its mate. This sound is very much like the croak uttered by *Batorides javanica*, and I was for some time under the impression that it was made either by that bird or some other small bittern or egret."

Typical
Kingfishers The common European kingfisher (*Alcedo ispida*), of which a figure is given on p. 1834, is the best-known representative of the short-tailed fish-eating kingfishers; in which section of the family there are three genera, namely, *Alcedo*, *Corythornis*, and *Alcyone*. Of these, the latter is exclusively Australian, and is characterized by having only three toes; while the second is confined to Africa and Madagascar, and is distinguished by its well-developed crest. The members of the genus under consideration are likewise crested, although to a smaller degree, the feathers giving a pointed form to the structure. Confined to the Old World, these kingfishers are represented by eleven species, three of which

are African, five Indian, and two Moluccan, while the remaining one is the common kingfisher, extending all over Europe, and Northwestern Asia, and represented in Siberia and the Oriental region by a smaller and brighter form, sometimes separated, as *A. bengalensis*. The common kingfisher is a beautiful bird, of a greenish blue color; with the back brilliant cobalt blue; the crown greenish blue banded with dusky black. Above the lores is a rufous sheath; the ear coverts are orange rufous, succeeded by a band of white feathers on the sides of the neck; the cheeks light blue, with dusky blackish bars; the throat buffy white; the remainder of the under surface rich orange rufous, with a patch of greenish blue on the sides of the upper breast; the bill black; the feet coral red; and the iris brown; the total length being seven and one-half inches. The female, which is a trifle smaller, may be distinguished by having a red base to the lower mandible. In England, owing to the protection which has been afforded to birds on the Thames and other rivers, the kingfisher is now more often observed than it was a few years ago, when it was much sought after for decorating ladies' bonnets. Especially in the autumn, when a considerable migration takes place, kingfishers may be noticed on the rivers in the south of England, and there are few more beautiful sights than one of these birds skimming over the water. Seated under overhanging willows or on an exposed bough or stump, the kingfisher watches patiently for the approach of its prey, when it dives like a flash of lightning under the water. It is, however, by no means always successful in capturing the fish, not unfrequently missing its stroke. Sometimes it may be seen hovering over the water like a kestrel, and dropping like a stone on a fish, when the fish comes near enough; while at other times it will perch on an overhanging reed, in order to take its dive after its prey. The latter comprises insects as well as fish; and on the seacoast, where the bird remains for some time before commencing its migration across the channel, the kingfisher will feed on small crabs. Although so exclusively a water bird, at most times of the year, the nest is not unfrequently found at some distance from any river. A few years ago, for instance, we were shown a nest with seven eggs, situated in the middle of a wood bordering the Thames, and fully a quarter of a mile from the water. This distance had to be traversed by the parent birds every time they brought a fish to their young, and it was a curious sight to see one of these brilliant birds flying like a meteor through the green foliage of the trees. The nest had been tunneled under the roots of a fallen tree, which had excavated a deep hole in a sandy bank as it fell; and in this instance the tunnel was by no means straight, but was carried over and under the roots which barred the progress of the bird in a direct line. Dawson Rowley maintained that the kingfisher not only bored its own hole in the banks, but that the fish bones found in the chamber at the end of the tunnel are placed there by the birds with the idea of forming a nest. There is, however, quite as often no nest whatever, the eggs being laid on the floor of the chamber.

In Africa the beautiful little crested kingfishers (*Corythornis*) take the place of the common species. Like the latter, these birds feed on fish and small crustaceans, boring a hole into some sandy bank in which to lay their eggs, which are four or six in number, on a small platform of fish bones. The three-toed Australian kingfishers (*Alcyon*) seem to have very similar habits.

Three-Toed Insectivorous Kingfishers This group brings us to the second subfamily (*Daceloninae*), all the members of which, although by no means disdaining a fish diet and thus frequenting rivers, are more exclusively inhabitants of forest and bush-clad country, where they subsist mainly on small reptiles, insects, crustaceans, and such-like creatures. The subfamily is characterized by the frequent large development of the tail; while the beak is either rounded or flattened, according as the fish-eating habit is more or less predominant. Although forest hunting, the members of the four genera, *Ceyx*, *Ceyxopsis*, *Ispidina*, and *Myioceyx*, are, however, characterized by having their tails as short as in the typical kingfishers. The first of these genera comprises a number of brilliantly colored kingfishers, of small size, inhabiting India and the countries to the east of the Bay of Bengal, throughout the whole of the Malayan Archipelago as far as Northern Australia. While many of them have the plumage of a brilliant red, shot with a lilac gloss, and with blue on the wings and scapulars, some of the Malayan and Papuan forms are mostly blue or black, with brilliant cobalt or silvery lower shades. One of the most striking of the red group is the Indian three-toed kingfisher (*Ceyx tridactyla*), in which the back is black with a mark of deep blue or purple, while the lower back is glossed with lilac; the wing coverts being black edged with blue; the tail cinnamon rufous; the head rufous marked with lilac; the ear coverts and cheeks orange yellow; the under parts also orange yellow; the bill and feet deep vermilion; and the iris brown. The total length is five and one-half inches. This pretty little bird inhabits the forest districts of Southern India and Ceylon, and is found from Nipal eastward through the Burmese countries down the Malayan Peninsula. Mr. Stuart Baker states that it is fairly common in Kachar, and is more of a fish eater than the Malayan species which are forest birds, living chiefly on insects. This kingfisher, indeed, lives chiefly on fish and water insects, with an occasional shrimp or fresh-water prawn. Its cry is a shrill, piping note, not unlike that of the common kingfisher, but shriller and less powerful, and not apparently uttered except on the wing. It has a very powerful flight, and is capable of great speed, darting along the stream like a ruby meteor. Even when the bird is not disturbed, but is merely moving from place to place, its flight is very swift. When it feeds, it returns again and again, to the same perch, and keeps to a confined area, being found day after day about the same spot, from which it seldom flies more than a mile. Mr. Baker has watched the birds making their tunnel into a sandy bank, and believes that the earth is pecked away by the bird's bill and the sand ejected by a backward motion of its feet.

Laughing Kingfishers Inhabitants of Australia and the Papuan islands, these birds are best known by the laughing kingfisher (*Dacelo gigantea*), or laughing jackass, as it is termed by the Australian settlers, which is a large bird, measuring seventeen inches in total length, with a wing of eight and one-half, and a tail of six and one-half inches. The general color is brown, with the lower back greenish blue; the median wing coverts being also washed with greenish blue; while the head is strongly crested, brown in color with rufous frecklings on the fore part, and the long crest feathers edged with white. There is a very broad white eyebrow extending backward and joining a collar on the neck;

the tail is rufous with irregular black bars, and the under surface of the body is white with a few margins of brown on the chest feathers, more distinct on the flanks. The female is like the male, but is rather more rufous on the head. Gould states that this kingfisher "frequents every variety of situation — the luxuriant bushes stretching along the coast, the more thinly timbered forest, the belts of trees studding the parched plains, and the brushes of the higher ranges being alike favored with its presence; over all these localities it is rather thinly distributed,



LAUGHING KINGFISHER.
(Two-thirds natural size.)

being nowhere very numerous. Its food, which is of a mixed character, consists exclusively of animal substances. Reptiles, insects, and crabs, however, appear to be its favorite diet; it devours lizards with avidity, and it is not an unfrequent sight to see it bearing off a snake in its bill, to be eaten at leisure; it also preys on small mammals. I recollect shooting one of these birds in South Australia, in order to secure a fine rat which I saw hanging from its bill, and which proved to be a rare

species." The laughing kingfisher breeds during August and September, and generally selects a hole in a large gum tree for the purpose, where it deposits its beautiful pearl-white eggs on the decomposed wood at the bottom. When the young are hatched, it defends its breeding place with great courage and daring, darting down upon any intruder who may attempt to ascend the tree. The other species of the genus are remarkable for the difference in the color of the tail, which is blue in the male and rufous in the female. Closely allied to the "jackasses" are the curious



AFRICAN WHITE-BREASTED KINGFISHER.
(Three-fifths natural size.)

hookbilled kingfishers (*Melidora macrorhina*), distinguished by a complete notch near the end of the upper mandible, which thus ends in a hook.

Wood King-
fishers

The most numerous group in the subfamily, these birds have been called king hunters to distinguish them from the kingfishers, inasmuch as many of the species do not fish at all. The genus contains upward of sixty species, all of which are distinguished from the laughing kingfishers by their more rounded wings and more compressed bill, which has a

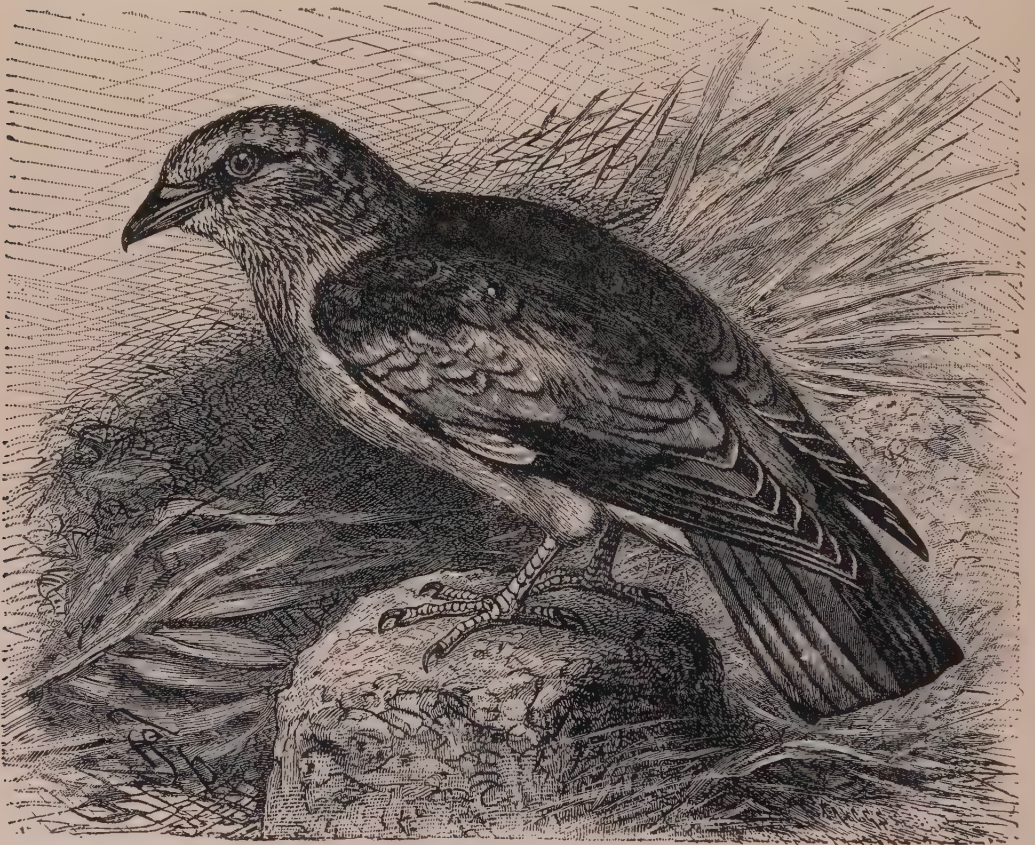
groove along the sides of the upper mandible. The best-known species is, perhaps, the white-breasted kingfisher (*Halcyon smyrnensis*), a bird of large size, measuring nearly a foot in length, with a wing of four and one-half inches or more. It is found all over India and Burma, extending eastward as far as China, while it also occurs in Palestine and Asia Minor in the west. The bill is red, the general color chestnut red, with the lower back bright greenish blue, the scapulars being also bright greenish blue; and the throat and breast pure white. This species generally makes its nest by burrowing in a sandy bank, the length of the tunnel varying from one to over three feet. Mr. Hume mentions an instance of a nest hole being found in Rajputana in a well, at least a hundred feet below the surface. In India this bird is found in all kinds of situations, often far away from water. In Kachar, Mr. Stuart Baker has found the nest composed of a few layers of loose moss with which the bird fills up a crevice in a rock. In most instances, however, there is no attempt at a nest, the eggs being deposited on the floor of the chamber at the end of the tunnel. Mr. Baker says that fish form a very minor part of the bird's diet, the principal part of which consists of locusts and crickets; and these it takes by swooping down on them from some perch, as if diving after fish, and seizing them from the bushes and grass, without halting in its flight. It also captures prawns, small crabs, and water insects from stagnant pools, and he has once or twice seen it take cicadas from the trunk of a tree. These kingfishers are very plentiful in Africa, one of the most beautiful species being the African white-breasted kingfisher (*H. semicærulea*), which has an entirely red bill, and is easily distinguished by its ashy-white head and chestnut breast and under wing coverts; the back being black, with the lower part bright blue, while the outer surfaces of the wings and tail are blue; and the throat and chest ashy white like the head. The length of the bird is about eight inches, and the wing four inches. This species is found over the greater part of Africa, as far as the Zanzibar district on the east, and to Angola on the west, being replaced in Southern Africa by an allied species (*H. pallidiventris*), and by *H. erythrogaster* in the Cape Verde islands. Von Hueglin states that in Northeastern Africa he found the present species both near water and in the wooded districts. It feeds on beetles and other insects, but also catches fish, which it seems to prefer.

In the genus *Tanysiptera* the number of tail feathers is reduced to ten, of which the central ones are greatly elongated, and exceed the body in length, generally ending in a racket-like expansion. Twenty species are known, all of which are inhabitants only of the Moluccas, the Papuan islands, and the Cape York Peninsula in Northern Australia. Mr. Wallace, who discovered several of the species during his travels in the Malay Archipelago, tells us that he found them in forests and also in rocks by the side of streams. Macgillivray, who found the beautiful *Tanysiptera sylvia* in Northeastern Australia, states that it frequented the dense bushes and the sunny glades in the woods. The flight is rapid, and it darts away among the dense foliage like an arrow. It is very wary, and sits on the bare branch of a tree, keeping a good lookout, and darting on to some passing insect, and then returning to the same perch. Its cry resembles the words *wheet, wheet, wheet*, and it is said to tunnel into the ant hills of red clay, which are common in that part of Australia.

THE ROLLERS

Family *CORACIIDÆ*

Birds of brilliant coloration, inhabiting most parts of the Old World, in the shape of the body, as well as in the conformation of the beak, the rollers strikingly resemble the crows. The palate is, however, of the bridged type, and the feet are like those of the kingfishers, both in respect of the flat sole and the union of the toes; while there are twelve tail feathers. The five genera are arranged under two



COMMON ROLLER.
(Two-fifths natural size.)

subfamilies. The first subfamily (*Brachypteraciinæ*) is represented by three genera confined to Madagascar, and characterized by the length of the metatarsus, and their terrestrial habits. Of the typical genus, as well as of *Geobiastes*, little has been related, but of *Atelornis* Grandidier states that both species live alone on the ground in the forests; the flight being straight and the birds only perching on the lower branches. Sir Edward Newton says that he only observed these birds

in the dusk of the evening near the ground, and remarks that they have a curious way of jerking the tail when alighting on a branch.

True Rollers In the true rollers the metatarsus is considerably shortened, and the habits of all the species are arboreal. In addition to the true rollers, the second subfamily also includes the broad-billed rollers (*Eurystomus*). In the common roller (*Coracias garrula*) and its allies the bill is long and compressed, being much longer than it is broad at the base; while the members of the genus are of brilliant plumage, and are found all over Africa, Southern Asia, and Malaysia, as far as the island of Celebes. The common roller is drab brown above, the rump greenish blue washed with purple; the wing coverts blue, the lesser ones purple; the head green with a bluish eyebrow; the base of the forehead sandy buff; the under surface of the body blue; the breast lilac brown; the sides of the neck and hind neck purplish lilac; and the wings and tail purplish blue with a band of silvery cobalt; the total length being twelve inches. Writing of the habits of this well-known bird, Naumann observes that it "is always restless and uneasy, moving from tree to tree, where it always settles on the summit, or on a dead branch. When undisturbed it is fond of sitting in the sunshine, but during rainy weather is dull and moping. It never hops about among the branches, but flies from branch to branch, now and then descending to the ground, where it hops heavily, and with an awkward demeanor. Its flight is quick, very easy, and much resembles that of a pigeon; in flying straight it flaps the wings quickly, turns and overbalances itself often, and glides or shoots through the air for some distance before dropping onto a dead branch. The ordinary voice may be best compared to that of the magpie. Rollers continually give a deep harsh *racker-racker-racker-racker*, which is very quickly uttered when they are squabbling; and with this they mingle a harsh *rräh*. When sitting peaceably, the note is a high *rack* and *rack-rack* and also a plaintive high *kräh*, not unlike that which a young jackdaw sometimes utters; this last is their call note. These notes quite often vary, and the bird is generally heard before he is seen. In fine weather the male rises in the air near where the female is incubating, uttering a single *rack*, *rack-rack*, etc., until he attains a considerable height, from which he suddenly falls, always turning a somersault, and throwing himself here and there in the air, uttering quickly the following *räh-räräh-rräh-rrä*, etc., etc., which he always changes to the *rack* as soon as ever he begins to turn his somersault, and then returns to his seat on a dead branch. This appears to represent his song. The bird chooses a sandy country as its breeding home, and affects thin woods where old oaks are scattered through, and which are adjacent to open fields and near large forests, particularly of pines, making its nest in hollow oak, ash, or other trees, and lining the interior with roots, straw, feathers, and hair. The male and female incubate in turn for the space of not quite three weeks, and when breeding they sit so close that, though at other times very shy, they may be caught on the nest."

Broad-Billed Rollers These rollers inhabit Africa, Madagascar, India, and China, ranging north to Eastern Siberia and south to the Malay Archipelago and Australia. They have the bill as broad as it is long at the gape. The oriental roller (*Eurystomus orientalis*) has the tail black with a bluish base; the head

blackish as well as the mantle; the back green, and the under surface blue, with the throat streaked with bright purplish blue, forming a gular patch, the total length being eleven inches. It inhabits the Burmese countries, extending down to the Malayan Peninsula and to the islands of Borneo, Java, and the Philippines. Bourdillon, after stating that he was attracted by the chattering of a pair of these rollers, says that "on going to the spot I found them engaged in ejecting from a



ORIENTAL ROLLER.
(One-half natural size.)

hole in a stump, about forty feet from the ground, a pair of our hill mynas. One of the rollers was in the mouth of the hole, and enlarging it by tearing away with its beak the soft rotten wood; the other roller, seated on a tree close by, was doing most of the chattering, making an occasional swoop at the mynas whenever they ventured too close. I watched the birds for some time until the mynas went off, and there and then began building in a pinney tree within the distance of one

hundred yards. Ten days after I sent for some hillmen, who managed to ascend by tying up sticks with strips of cane, in the way they erect ladders to obtain the wild honey from the tallest trees in the forest. It was past six o'clock in the evening before a man reached the hole in which the birds had bred. He found not the slightest vestige of a nest, but a few chips of rotten wood, upon which were laid the three eggs. These I found to be slightly set. While the man was climbing the tree, the birds behaved in a very ridiculous and excited manner. Seated side by side on a bough, they alternately jerked head and tail, keeping up an incessant harsh chatter, and as the crisis approached, and the man drew nearer their property, they dashed repeatedly at his head."

THE KIROUMBOS

Family *LEPTOSOMATIDÆ*

The remarkable birds commonly known by their native name of Kiroumbos are confined to Madagascar and some of the neighboring islands, and may be regarded as aberrant rollers, although they also exhibit affinities to the under-mentioned frogmouths, in the possession of "powder-down" patches on the sides of the lower part of the back. Only two members of the family are known, both of which are included in the genus *Leptosoma*. The bill is roller-like, but the nostrils are quite peculiar as regards their situation, being placed in the middle of the upper mandible, and are shut in by a horny plate; while the loreal plumes are curved forward so as to entirely hide the base of the bill. The feet are semi-scansorial, that is to say, the fourth toe is cleft to the base and partly reversible, and the tail feathers are ten in number. The sexes are different in color, the male having some considerable metallic sheen, and the upper surface being green glossed with a distinct coppery shade; the tail is grayish black, glossed with metallic green, and, more slightly, with coppery red; the entire under surface is dark ashy gray, becoming white on the abdomen and under tail coverts; and the head is crested and of a leaden-gray color, glossed with metallic green and copper. The total length is sixteen inches. The female is quite different from the male, being rufous brown above, with the head black, and the sides of the head and back of the neck barred with black; the back spotted with buff and glossed with dull green and copper; the tail brown, blackish towards the tip, which is edged with rufous; the under surface of body pale fawn color spotted with greenish black. The Madagascar kiroumbo inhabits the island from which it takes its name, as well as Mayotte and Anjouan islands, but in the great Comoro island is replaced by the smaller *L. gracile*. It is said by Grandidier to live in little parties of ten or twelve individuals on the edges of the woods. As soon as one of the birds is shot, all the others come near the hunter or hover over their dead companions, so that ten or more can be obtained in a quarter of an hour. That the kiroumbo has a certain element of a roller in its composition is shown by its habit of playing in the air, which Sir Edward Newton describes as follows: "It plays for some time over the same place, ascending

almost perpendicularly, as it were by a jump, to a great height, and descending again in a curve nearly to the top of the trees, by almost closing its wings, at the same time uttering a whistle so like that of an eagle that it was doubted



MADAGASCAR KIROUMBO.
(One-fourth natural size.)

for a long time by us whether the bird that performed this wonderful freak was not a raptorial. However, after having watched it several times with our glasses, we satisfied ourselves that it was this species."

THE FROGMOUTHS

Family *PODARGIDÆ*

These curious birds have been usually associated with the nightjars, to which they approximate in their wide mouths and mottled plumage, although they differ in the more important feature of the palate, being constructed on the desmognathous instead of on the schizognathous type. Accordingly, it seems most probable that their true position is between the kiroumbos and the oilbirds (to be mentioned next). From the former they are distinguished by the absence of an oil gland, and the presence of only ten feathers in the tail; while from the latter they differ by the absence of the articular surfaces on the rostrum of the hinder part

of the palate, known as basipterygoid processes. Unlike the nightjars, these birds have no comb-like appendage to the third toe; while they further differ by building nests, or laying their eggs in hollow trees. Two notches occur in the hinder border of the breastbone.

Typical Frog- These birds, *Podargus*, are the typical representatives of the first, **Mouths** of the two subfamilies into which the group is divided, this subfamily being distinguished by the narrow, slit-like nostrils, protected by an overhanging membrane, and hidden by plumes and feathers. Powder-down patches occupy each side of the rump, and the metatarsus is shorter than the third toe. The present genus, which is characterized by the pointed tail feathers, includes five species, all inhabitants of Australia and the adjacent Papuan islands. Gould describes the Australian species as inanimate and sluggish birds, depending on their supply of food less upon their power of flight than upon the habit they are said to have of traversing the branches of trees on which their favorite insects reside. At intervals during the night they sit about in open places, on rails, stumps of trees, or the roofs of houses. They are strictly nocturnal in their habits, sleeping during the day, and mostly found in pairs, perched near each other on the branches of the gum trees, in situations not at all sheltered from the beams of the midday sun. "So lethargic are its slumbers," he writes, "that it is almost impossible to arouse it, and I have frequently shot one without disturbing its mate sitting close by; it may also be knocked off with sticks or stones, and is sometimes even taken with the hand. When aroused, it flies lazily off with heavy flapping wings to a neighboring tree, and again resumes its slumbers till the approach of evening, when it becomes as animated and active as it had been previously dull and stupid." According to Mr. North, in New South Wales, the tawny-shouldered frogmouth commences to breed in September, and the breeding season is at its height in October, and continues for the two following months. It builds a flat nest of sticks, loosely placed together on the horizontal branch of any suitable tree. The eggs are three in number, perfectly white, elongated in form, and the shell finely granulate.

Eared Frog- Their smaller size and rounded tail feathers distinguish these birds **Mouths** from the preceding, while the mode of nesting is also different. The side of the head in some of the species is adorned with ear tufts, ending in bristling plumes. The sexes also are mostly different in color, the female being rufous and the male grayer. One of the largest species is the great-eared frogmouth (*Batrachostomus auritus*), inhabiting the Malay Peninsula, Sumatra, and Borneo. It measures about sixteen inches in length, and is chestnut brown, vermiculated with blackish lines, and whitish bars. On the hind-neck is a collar of buffy-white feathers, with a black border, forming bands; median and greater wing coverts with large spots of white edged with black; throat and breast brown, with spots and bars of white; and the abdomen pale buff. Nothing has been recorded of its habits; but of the nest of the South-Indian frogmouth Mr. Hume writes that "instead of moss, a few fragments of dead leaves are incorporated, but the material is chiefly a soft felt-like mass, precisely similar to that used by *B. hodgsoni*, but grayish white instead of brown. It is a mere pad with a shallow depression on the

outer surface, a broad groove on the base of the nest showing where it had nested on the upper surface of an almost horizontal bough." The egg was white. Mr. Hartert says that the part is formed by the down, taken from the "powder downs" of the bird itself, and then completed by having the outside interwoven and covered with bits of bark and lichen, so that the nest entirely resembles the branch to which it is attached. The nests of *B. hodgsoni*, which Mr. Hume describes, were about three and a half inches in diameter and three-quarters of an inch in thickness; the lower surface of the pad, where they were in contact with the branch hav-



GREAT-EARED FROGMOUTH.

(One-half natural size.)

a thin coating of moss. The whole of the nest is a compact, brown, felt-like mass, very soft and downy, and composed, as it appears to be, of excessively fine moss rootlets, but withal as soft as the fur of any little mammal. This will doubtless be found to be the powder down of the bird itself.

**Owlet Frog-
Mouths**

These birds differ from the other frogmouths in having the nostrils situated near the tip of the bill, and being open and prominent. There are no distinct powder-down patches, and the metatarsus is longer than the middle toe. The loreal bristles are greatly elongated, and give the

face a peculiar appearance. Eleven species are known, all found in Australia and the adjacent Moluccan and Papaun islands, as well as in New Caledonia. The Australian owlet frogmouth (*Egotheles novæ-hollandiæ*), which is about eight and one-half inches in length, has the general color dusky with whitish vermiculations; the head being darker, with two longitudinal stripes of white and two crescentic marks of white on the hind part and nape; while the under surface of the body is white with dusky vermiculations, and the abdomen and under tail coverts more or less uniform. This species ranges all over Australia and Tasmania, Gould stating that he found many specimens and procured the eggs, which are four or five in



AUSTRALIAN OWLET FROGMOUTH.
(Two-fifths natural size.)

number, pure white, and are laid in the hole of a tree, without any attempt at a nest. "During the day," he says, "the bird resorts to the hollow branches or spouts, as they are called, and the holes of the gum trees, sallying forth as night approaches in quest of insects, particularly small beetles. Its flight is straight, and not characterized by the sudden turns and descents of the goatsuckers. On driving it from its haunts, I have sometimes observed it to fly direct to a hole in another tree, but more frequently to alight on a neighboring branch, perching across and never parallel to it. When assailed in its retreat, it emits a loud hissing noise,



(1852)

THE HOME OF THE OILBIRD.

and has the same stooping motion of the head observable in the owls; it also resembles these birds in its erect carriage, the manner in which it sets out the feathers round the ears and neck, and in the power it possesses of turning the head in every direction even over the back, a habit it is constantly practicing."

THE OILBIRD OR GUACHARO

Family *STEATORNITHIDÆ*

Forming a family group by itself, the South-American oilbird (*Steatornis caripensis*) in external appearance is not very unlike a nightjar; to which group it also approximates in habits, only coming out to feed in the dusk of the evening. It is, however, more nearly allied to the frogmouths, having a similar bridged palate, although differing in certain features of the skeleton. The plumage is less soft than in either the goatsuckers or frogmouths; while the beak and the form of the wing are not unlike those of the rollers. The tail carries ten feathers, and in the wing the third and fourth primary quills are the longest; while the naked metatarsus does not exceed the third toe in length. In the skull the basal rostrum carries articular basipterygoid processes. Measuring from seventeen to twenty inches in total length, the oilbird is chestnut brown in general color. On the upper parts the plumage is marked by numerous dark crossbars; the median wing coverts are ornamented with large white spots, similar spots also occurring on the lateral upper tail coverts; while the under surface is pale chestnut, with a grayish tinge, each feather being marked with three rhomboidal spots of white bordered with black. The beak is chocolate brown; the feet are flesh colored, with a violet tinge; the claws are gray; and the iris of the eye is black with a narrow dark brown ring. The guacharo is principally known as an inhabitant of the island of Trinidad, where it frequents certain caves, building therein huge nests, having the appearance of large cheeses. The popular name of oilbird is derived on account of the peculiar covering of the nestlings, which are simply masses of yellow fat. Numbers of the stones of a fruit upon which these birds apparently feed strew the floor of the caves where they dwell. Elsewhere local, the oilbird is found not only in Trinidad, but also from Guiana and Venezuela to Ecuador and Peru, occurring in the latter countries in valleys at an elevation of some seven thousand feet. In the Tatora district of Peru there are several caverns, situated in a very wild country, clad from the base to the summit of the hills with dense virgin forest, frequented by these birds. According to Dr. Stolzmann, if a gun be fired, or any other loud noise made near these caverns, the birds quit their retreats in the nooks and crannies, flying to the roof with piercing cries, and the only way to obtain specimens is to fire at random in the darkness. This, however, is haphazard work, and in the Ninabamba cavern only eleven birds were killed in return for sixty shots. When the birds are tired out, they gradually retire to their hiding places, from which no amount of firing or shouting will induce them to again emerge. When undisturbed, the guacharos quit their retreats as the sun is setting, to fly about the forest; some

of them rising to a considerable elevation, apparently in pursuit of moths. Their noiseless flight much resembles that of goatsuckers, but in descending rapidly the wings are frequently raised and held together in a point. Their principal food consists of the fruit of the nectandra trees; these fruits being seized by the birds while in full flight from the tips of the slender boughs which would be too frail to bear the weight of the robbers. For seizing such fruits the hooked and powerful bill of the oilbird is most admirably adapted. The rapidity with which the guacharos feed is remarkable; two specimens killed by Stolzmann early one evening having their crops empty, whereas one shot a quarter of an hour later had swallowed seven fruits, and a second bagged after another quarter of an hour no less than eleven. The same observer remarks that it would be curious to know what the birds did for the remainder of the night, after having satisfied their appetite, for he has seen them on moonlight evenings on the wing as late as eleven. The note of the guacharo is harsh and disagreeable, and has been compared to the syllables *cri-cri-cirri*; although there is another cry which cannot be rendered in words. From observations on a young bird, in the gray nestling plumage, Stolzmann found that the large nectandra stones are regurgitated after the fleshy covering has been digested. This rejecting process is accomplished without any apparent effort on the part of the bird; a slight movement of the feathers of the throat takes place, the beak opens gently, and the stone appears; while, if any of the fleshy covering still adheres to it, the bird picks it off. The old birds apparently cast up the stones during flight, and although no insects were found in the stomachs of the specimens shot, Stolzmann is of opinion that guacharos are partly insectivorous. Humboldt and Bonpland visited the celebrated cavern of Caripe, from whence these birds take their specific name, and the following account of the visit is taken from a biographical work. "The Indians," it is written, "showed the travelers the nests of the guacharos by fixing a torch to a long pole. These nests were fifty or sixty feet high above their heads, in holes in the shape of funnels, with which the roof of the grotto was pierced like a sieve. The noise increased as the travelers advanced, and the birds were scared by the light of the torches. When this noise ceased for a few minutes, around them they heard at a distance the plaintive cry of the birds roosting in other ramifications of the cavern, and it seemed as if different groups answered each other alternately. The Indians were in the habit of entering this cavern once a year, near midsummer; when they went armed with poles, with which they destroyed the greater part of the nests. At that season several thousand birds were killed, and the old ones, as if to defend their brood, hovered over the heads of the Indians, uttering terrible cries. The young, which fell to the ground, were opened on the spot for their fat. At the period commonly called at Caripe the oil harvest, the Indians built huts with palm leaves near the entrance, and even in the porch of the cavern. There, with a fire of brushwood, they melted in pots of clay the fat of the young birds just killed; this fat being known by the name of guacharo butter." The nest is formed of clay; and the eggs, varying from two to four in number, have a thick shell, which is at first chalky white, but by contact with the nest becomes yellowish green.

CHAPTER X

THE PARROT TRIBE—ORDER PSITTACI

ONE of the most interesting groups of birds is that of the parrots, under which general term may be included not only the true parrots, but likewise the macaws, lorries, love birds, cockatoos, etc. This general interest is due not only to the beauty of form and gorgeousness of plumage characterizing so many members of the group, but likewise to the ease with which they are domesticated, their pleasing manners when in this state, and above all to the extraordinary facility with which they recollect and repeat sentences of human speech. That the memory of parrots is very strongly developed, there can be no sort of doubt; but whether their intellectual powers rank really higher than those of some of the Passerine birds is problematical. The appropriateness to the occasion with which sentences learned by these birds are sometimes uttered is probably mainly or entirely due to association, and in no sense implies any knowledge of the meaning of the phrase. It may be added that the occasions when such phrases are introduced inappropriately are, perhaps, not much less infrequent than when they are opposite.

Parrots form a large group, including considerably more than five hundred species, which present well-marked characteristics by which its members can be readily distinguished from all other assemblages of birds. Their most obvious external characteristics are displayed by their feet and bill. In the feet the fourth toe (as in some of the Picarians) is permanently turned backward, and as the first toe has likewise a similar direction, the whole foot is divided into a front and back portion, each comprising two digits; this type of foot structure being termed zygodactyle. The covering of the feet takes the form of rough granular scales. As regards the beak, its base is invested with the wax-like protuberance termed the cere, which is frequently feathered, while in form it is short, stout, and strongly hooked at the extremity. In addition to the above, it may be noted that, owing to the presence of a transverse hinge in the skull, the upper half of the beak is movable, while the palate is of the bridged (desmognathous) type. The skull, as shown in the figure in the introductory chapter, is also very generally distinguished by the presence of a complete bony ring surrounding the socket of the eye, and the symphysis of the lower jaw is short, obtuse, and deeply channelled. The tongue is also thick and fleshy, and may be fringed or brush like at the extremity. Extreme shortness characterizes the legs of most of the species, this shortness being most marked in the metatarsus, of which the bone is greatly expanded. The leg bone, or tibia, generally has no bony bridge at the lower end. The furcula is always weak, and may be incomplete or even wanting. The feathers are provided with aftershafts, and the number in the tail is, except in one genus, ten. If an oil gland is present

it is furnished with a tuft of feathers. Finally, the young are born in a nearly naked and completely helpless condition; and the eggs are usually, if not invariably, white.

Distribution and Habits For the most part parrots are thoroughly arboreal and climbing birds, and are essentially characteristic of the tropical and subtropical regions of the globe. At the present day none inhabit Europe, although the remains of an extinct species apparently allied to a living West-African species, have been obtained from the Miocene rocks of France. In America one species extends as far south as the straits of Magellan, while another ranges far into the United States; and in the Macquarie islands of the Australian region, the group extends as far south as the 55th parallel. Although ranging over all the warmer regions of the globe, these birds are very unequally distributed, being



COCKATOOS AT HOME.

poorly represented in India, and still more so in Africa, while in Malaysia and Australia they attain their maximum diversity of type, and in South America their greatest numerical development.

All the parrots make their nests in the hollows of trees, where they usually lay from two to three white eggs, although in the case of some of the smaller species the number is often considerably more. Frequently the males take their share in the work of incubation, which generally lasts for about twenty-one days. The young parrots are fed by the parents disgorging half-digested food from their own crops into their open mouths, after the manner of pigeons. The food of the adult consists in most cases of various fruits and nuts. Regarding their general habits, and the important part these birds play in tropical scenery, Mr. Wallace writes as follows: "They usually feed in flocks; they are noisy, and so attract attention; they love gardens, orchards, and open sunny places; they wander about far in search of food, and toward sunset turn homeward in noisy flocks or in constant pairs. Their

forms and motions are often beautiful and attractive. The immensely-long tails of the macaws, and the more slender tails of the Indian parraquets; the fine crests of the cockatoos; the swift flight of many of the smaller species, and the graceful motions of the little love birds and allied forms, together with their affectionate natures, aptitude for domestications, and powers of mimicry, combine to render them at once the most conspicuous and the most attractive of all the specially tropical forms of bird life."

As is so generally the case with arboreal fruit-eating birds, the prevalent color among the parrots is green. This is, however, frequently relieved by patches, bands, or spots or other hues; while in certain groups or species it is replaced by blue, yellow, cinnamon, crimson, white, and occasionally black. Judging from the characteristics of the skeleton, it appears to us that the nearest allies of the parrots are the owls. They may, however, have some kinship with the diurnal birds of prey, and possibly with some of the Picarians. According to the arrangement proposed by Count Salvadori, who has paid special attention to this group of birds, the parrots may be divided into five families, of which the first is the

NESTOR PARROTS

Family *NESTORIDÆ*

Under the common title of nestors may be included a small group of peculiar parrots confined to New Zealand and certain neighboring islands, all of which belong to a single genus (*Nestor*), and one of which is known to the Maories as the Kea and the other as the Kaka. The nestors belong to an assemblage of three families of the order, characterized by the under surface of the hook of the beak being either smooth or merely marked by some fine longitudinal lines. As a family they are distinguished by the more or less elongated beak being much compressed, and longer than deep, with the middle line (culmen) of its upper moiety marked by a longitudinal groove, while the profile of the symphysis of the lower mandible slopes upward to the tip with scarcely any curvature. The tip of the tongue is provided with a fringe of fine hairs, and the cere of the beak is partially feathered. All the feathers are soft; those situated at the base of the lower mandibles are hairy, and project forward, and the rectrices of the tail have pointed shafts projecting beyond the vane. The metatarsus is longer than usual, and the bony ring round the socket of the eye is incomplete. The nestors are represented by four well-defined species, two of which are now extinct. Of these the kea (*Nestor notabilis*), which is restricted to the South island of New Zealand, has the general hue of the plumage dull olive green, with black edges to the feathers. There is no yellow band across the breast, and the under parts are olive brown without any tinge of red; orange red is, however, present on the under wing coverts and axillaries. The wing feathers are dusky brown, the primaries having the outer web bluish, and the inner one toothed with lemon yellow. The tail is bluish orange, with a broad transverse band of blackish brown near the end; the inner webs of the feathers being toothed with

yellow. In size the kea may be compared to a raven; its total length being nineteen inches, of which one and three-fourths is taken up by the bill. The kaka (*N. meridionalis*), which inhabits both islands, and is the species represented in our colored plate, is a rather smaller bird, readily distinguished by the presence of a red tinge on the abdomen and under wing coverts, as well as by a wash of golden yellow on the ear coverts. It is subject to a considerable amount of local variation. Still smaller, although with a longer beak, is the extinct Phillip island parrot (*N. productus*), of which a figure is given on p. 1859. This bird attained a length of about fifteen inches, and was distinguished by the broad yellowish-white band across the chest. Also extinct, the Norfolk island parrot (*N. norfolcensis*), the smallest of the group, was distinguished from the Phillip island species by the high curvature and length of the bill, which measured three and one-half inches, and by the absence of a dark bar on the tail.

Habits Confining our attention to the New Zealand representatives of the genus, it may be observed in the first place that the brush-like extremity of the tongue of these birds indicates flower-sucking habits. They are generally found in mountain regions, the kea ascending to elevations of some six thousand feet. The kaka is an eminently-social bird, and by far the noisiest of the denizens of the woods of its native islands. "Being semiocturnal in its habits," writes Sir W. Buller, "it generally remains quiet and concealed during the heat of the day. If, however, the sportsman should happen to find a stray one, and to wound instead of killing it, its cries of distress will immediately raise the whole fraternity from their slumbers, and all the kakas within hearing will come to the rescue, and make the forest echo with their discordant cries. Unless, however, disturbed by some exciting cause of this sort, they remain in close cover till the approach of the cooler hours. Then they come forth with noisy clamor, and may be seen, far above the tree tops, winging their way to some feeding place; or they may be observed climbing up the rough vine-clad boles of the trees, freely using their powerful mandibles, and assuming every variety of attitude, or diligently tearing open the dead roots of the close epiphytic vegetation in their eager search for insects and their larvæ. In the spring and summer, when the woods are full of wild blossom and berry, these birds have a prodigality of food, and may be seen alternately filling their crops with a variety of juicy berries, or sucking nectar from the crimson flowers of the rata (*Metrosideros*) by means of their brush-fringed tongues. With the earliest streaks of dawn, and while the underwoods are still wrapped in darkness, the wild cry of this bird breaks upon the ear with strange effect." It is from the oft-repeated cry of *kaka-kaka*, that the bird derives its name. In dull weather kakas may often be seen abroad in the daytime, while occasionally flocks may be observed sweeping across a forest glade in the full sunlight. In spite of their slow and measured flight, these birds periodically migrate from one part of the country to another, generally traveling in parties of three or more, and frequently stopping to rest on the bare boughs of some dead forest tree. During the pairing season the male and female are constantly in each other's company, flying side by side, and calling as they go. The breeding commences in November, the nest being a poor affair, made in the hollow of the trunk of a decayed tree. Here four eggs are usually laid, although it



KAKA PARROTS.

is said that there may sometimes be as many as six; and the young are able to fly early in January. Being an excellent mimic, the kaka is highly esteemed by the Maories as a pet, and, like most parrots, will live many years in captivity.

The habitat of the kea is very different from that of its cousin. In place of being confined to wooded districts, this bird frequents the almost inaccessible rocks of the mountains of the South island at elevations where only dwarf vegetation is to be found. Here the keas may be seen among the crevices of the rocks when the mountains are shrouded in mist or sleet, or covered with a mantle of snow; while at other times they may be observed soaring with motionless wings from peak to peak. During the depth of winter these birds are, however, driven to seek their food at lower elevations. The usual cry of the kea has been compared to the mewing of a cat, but a scream not unlike that of the kaka is also uttered at times. The most remarkable feature in connection with the habits of the kea is its carnivorous propensities, which appear to have been developed since the introduction of sheep into the colony, and have led to a great increase in the number of these birds. Sir W. Buller writes that those keas which "frequent the sheep stations appear to live almost exclusively on flesh. They claim the sheep's heads that are thrown out from the slaughter shed, and pick them perfectly clean, leaving nothing but the bones. The plan usually adopted on the stations for alluring this bird, is to expose a fresh sheep skin on the roof of a hut; and while engaged in tearing up the

bait, it is easily approached and snared. Of recent years the keas have gone even farther than this, and now actually kill sheep for themselves, alighting upon



PHILLIP ISLAND PARROT.

the backs of the unfortunate Ruminants, and tearing down through the skin and flesh until they reach the kidneys, the fat of which is greedily devoured. In disposition keas display extreme curiosity, and in the mountains they display so little fear of man that they may easily be knocked over with a stone."

THE LORIES AND LORIQUETS

Family *LORIIDÆ*

Although agreeing with the nestors in the general structure of their beaks, the beautiful birds known as lories and loriquets, of which there are several genera, differ by the tongue being furnished with a kind of brush instead of a fringe, and also by the middle of the upper mandible being devoid of a groove. The beak,



HEAD AND TONGUE OF LORY.
(From Garrod, *Proc. Zool. Soc.*, 1872.)

which is much compressed and generally longer than deep, has no notch; and the cere decreases in width from the middle line of the head to the sides of the beak. There is great variation in the length of the tail, but it is generally shorter, although occasionally longer than the wing, while in form it may be either graduated or rounded. The wings are sharply pointed (acute), and generally have the first three feathers the longest.

Although unrepresented in New Zealand, the members of the family are confined to the Australasian region, inclusive of Polynesia. They comprise upward of fourteen genera, of which only a few can be noticed in this work; the dimensions of the species varying from those of a turtledove to little more than those of a sparrow. There is one genus (*Oreopsittacus*), represented in New Guinea, in which the tail has fourteen feathers, and thereby differs from that of all the other parrots.

True Lories We select as our first example of the family the well-known purple-capped lory (*Lorius domicella*), from Ceram and Amboyna, which is the typical representative of the genus to which it belongs. All the members of this genus—ten in number—are characterized by the tail being of moderate length and rounded, with the two middle feathers longer than the others. The bill is orange red, thus distinguishing the group from the black lory and its allies (*Chalcopsittacus*), where it is black; while the green wings serve to differentiate these parrots from the blue-necked lory, and the other members of the genus *Eos*, in which there is a considerable amount of red on the wings. The purple-capped lory measures about a foot in total length, a third of which is

taken up by the tail. It is a gorgeously-hued bird, the general ground color of the plumage being scarlet, while the breast is adorned with a gorget of gold; the wings are green, with blue at the bend and on the under coverts, and the tail is red, with a band at the tip, which is dark purple red above and golden red below. The feature from which the species takes its popular name is the deep purple cap on the head, which is often of so dark a tint as in some lights to appear almost black.

Like other lories, this species is a honey sucker, but as the brush on its tongue is less developed than in some of the other members of the family, it is capable of



PURPLE-CAPPED LORY.
(One-half natural size.)

living on other substances than honey, and is thus more easily kept in captivity. Lories are generally found in small parties of half a dozen or so, and Dr. Guillemard states that in the Moluccas they may frequently be seen devouring the soft fruits of various kinds of figs. They generally lay from three to four eggs on the bare wood in some hollow bough, and the young leave their domicile in about six weeks after the commencement of incubation. The species here figured is remarkable for its gentle and affectionate disposition, as well as for its talking powers; for which reasons, together with the gorgeousness of its plumage, it is in much request as a pet. Mr. Gedney writes that "as a ventriloquist the purple-cap possesses no equal,

and the manner in which he will imitate domestic sounds, throwing his voice to the opposite side of the room, is perfectly startling to a stranger." The black-capped, or tricolored lory (*L. lory*), from New Guinea, etc., belongs to the group in which there is no yellow gorget; it has the whole of the abdomen blue, a red throat, green wings, and a black cap.

Loriquets The loriquets are smaller birds than the lories, with the tail feathers elongated and gradually tapering to a more or less acute point. In the present genus, of which we take Swainson's loriquet (*Trichoglossus novæ-hollandiæ*) as a well-known example, the prevailing color of the plumage, both above and below, is green; the tail feathers being entirely of this hue, and moderate in length. The two middle feathers of the tail are not greatly elongated; while the



SWAINSON'S LORIQUET.
(One-half natural size.)

four or five first primaries of the wings are not greatly narrowed at their tips. On the forehead the streaks on the shafts of the feathers are more or less blue, while the breast is more or less tinged with red; these two characteristics serving to distinguish these birds from the members of the allied genus *Psitteuteles*. The range of these loriquets extends from New Guinea to Celebes. Swainson's loriquet attains a total length of twelve inches, of which five and one-half inches are taken up by the tail, and is thus one of the largest representatives of the genus. In coloration it is, perhaps, the handsomest of all the Australian parrots; the head and throat being of a

brilliant purplish blue, the nape of the neck greenish yellow, the abdomen blue, and the remainder of the body, together with the upper surface of the wings and tail, green. The under tail coverts are yellow at the base and green at the tip, while the under wing coverts are red. A yellow tip characterizes the red bill, and the feet are slaty gray. This handsome bird is an inhabitant of East Australia, ranging from Cape York to Victoria, and is likewise found in Tasmania. By the colonists it is commonly termed either the Blue mountain lory, or the Blue mountaineer. Like its allies, it is almost exclusively a honey sucker, and so much honey do they gather, that when shot, as Professor Moseley tells us, it is quite common to see this fluid streaming out of their beaks. They generally associate in small flocks, and during their flight utter loud screaming cries. During their migrations, according to the "Old Bushman," they may, however, congregate in immense numbers, and may then be seen flying at great heights. With regard to these periodical movements the same observer writes that these birds are "migrants to and from different districts, and their migrations are regulated by the state of the blossoms of the gums and honeysuckles upon which they feed; not that they ever entirely left our forests, for I rarely at any time went out without seeing a pair or so. But the large flocks of them only come at such times as the trees are full of honey, and depart as suddenly as they come. They are always in larger or smaller flocks, do not associate with the other parrots, and are never seen feeding on the ground." The female lays from three to four eggs, and in their first plumage the young have the breast yellow, with scarcely any tinge of red, while the band on the nape of the neck is scarcely visible. In captivity this parrot is by no means a desirable species, since it is exceedingly noisy and very difficult to keep for long. In this state it will eat insects and seeds, as well as honey and syrup.

Arfak Parrot The Arfak parrot (*Oreopsittacus arfaki*) already referred to as having fourteen tail feathers, is a native of the Arfak mountains in New Guinea, and only measures six inches in length. The general color is dark green, with the cheeks and ear coverts blue, a tinge of red on the abdomen, the tail feathers black, with red tips, and the beak black.

Family *CYCLOPSITTACIDÆ*

Two genera of parrots from Australia, New Guinea, and the Eastern Malayan islands, known as *Neopsittacus* and *Cyclopsittacus*, are regarded by Count Salvadori as indicating a distinct family of the order allied to the lories. While agreeing with the two preceding families in having the under surface of the hook of the bill nearly smooth, they differ in that the bill is deeper than long, and much swollen on the sides, the profile of the symphysis of the lower mandible being highly convex. In these respects these parrots serve to connect the lories with the following families. The nature of the tongue is unfortunately still unknown. Perhaps the best-known representative of the group is the iris parrot (*N. iris*) from the island of Timor—a small, green parrot, measuring seven and three-fourths inches in length, with a yellow-orange bill. There is but one other species of this genus (*N. musschenbroeki*),

from New Guinea, all the species of the allied genus (*Cyclopsittacus*) being distinguished by the dark color of their beaks.

THE COCKATOOS

Family CACATUIDÆ

The remaining groups of the order are distinguished from those already noticed by the nature of the under surface of the hook of the beak. This, in place of being smooth or with fine longitudinal striæ, is marked by a series of bold transverse ridges, running from either side of the middle line in a more or less oblique direction, so as to produce a file-like surface. Moreover, in all cases the tongue is quite simple, being unprovided with any kind of brush or fringe.



COCKATOOS.

The cockatoos are readily distinguished by the presence of a crest of feathers on the head, which is wanting in all the members of the next family, with the exception of the peculiar horned and Uvæan parraquets (*Nymphicus*), respectively from New Caledonia and the island of Uvæa in the Loyalty group. An absolutely distinctive feature between the two families is, however, to be found in the skull. Thus in all the cockatoos the socket of the eye is surrounded by a complete ring of bone, from the lower border of which is given off a process extending backward to the hinder part of the skull; whereas in the true parrots (*Psittacidæ*) this ring is generally incomplete, while in such instances as it is entire, it lacks the posterior bony process. As minor characteristics it may be mentioned that the nostrils open in a cere which is not much swollen, and is generally naked, although occasionally feathered.

The bill is of great depth, and usually very short, the upper mandible being generally much compressed, with its hook at right angles to the axis of the base. In all cases the metatarsus is extremely short.

The cockatoos are characteristic of the whole Australasian region, ranging as far west as the islands of Celebes and Lombok, and also represented in the Philippines; eastward, however, their range is limited by the Solomon islands, and they are consequently unknown in New Zealand. With the exception of the aberrant cockateel (*Callopsittacus*) of Australia, which constitutes a separate subfamily, the whole of the members of the family are characterized by their short and broad tails.



HEAD OF GREAT BLACK COCKATOO, WITH CREST DEPRESSED.
(From Guillemard's *Cruise of the "Marchesa."*)

Their coloration differs markedly from that of the other groups of the order. In the majority of the species white is the predominant color, but this may be more or less tinged with red or yellow, more especially in the crest and on the under surface of the tail. In the rose-breasted cockatoo the whole breast is, however, red, while the upper surface of the body, together with the wings and tail, are various shades of gray, while the ganga is all gray with the exception of the red head. In other

species the prevalent tint is black or dark blackish brown. All lack the green, so characteristic of the parrots in general, although a tinge of this color exists on the wings of the ganga.

Great Black Cockatoo The largest of all the cockatoos, and indeed one of the biggest of the whole parrot tribe, is the great black cockatoo (*Microglossus aterrimus*), of the Papuan islands and North Australia, which is the sole representative of its genus, and may be compared in size to a raven. It differs from



GREAT BLACK COCKATOO, WITH CREST ERECTED.
(One-fourth natural size.)

all the other members of the family in that the flesh-colored cheeks are entirely naked, and it takes its generic name from the small size of its tongue, which is slender and worm-like, and thus quite unlike that organ in other parrots. It is further characterized by the upper mandible being much compressed, and narrower than the lower one, while the great elongation and narrowness of the feathers of



BANKSIAN AND SLENDER-BILLED COCKATOOS.

(1867)

the crest are also distinctive. In the living state the plumage is of a slaty-black tint, powdered with gray; the forehead and lores being deep velvety black; while the feathers of the wings and tail exhibit green reflections. The naked cheeks are pale red, bordered with equally pale yellow, and the bill and feet are black. In length this magnificent, but funereal-looking bird, measures from twenty-nine to thirty-one inches, some ten of which are taken up by the tail. The largest specimens come from the mainland of New Guinea, those inhabiting the Aru islands being considerably smaller. The tongue occupies only a small space in the enormous mouth, and has been compared to a round pink worm with a black head, and is partially extensile. The color of the naked skin of the face is subject to considerable variation in the living bird, and, at times of excitement, owing to a kind of blushing process, becomes of a deep blood red. That the enormously powerful bill of this bird must have some special use is quite evident, and its particular office has been described by Mr. Wallace in the following interesting account of the creature's habits: "The great black cockatoo," writes this observer, "frequents the lower parts of the forest, and is seen singly, or at most two or three together. It flies slowly and noiselessly and may be killed by a comparatively-slight wound. It eats various fruits and seeds, but seems more particularly attached to the kernel of the kanary nut, which grows on a lofty forest tree (*Canarium commune*), abundant in the islands where this bird is found; and the manner in which it gets at these seeds shows a correlation of structure and habits, which would point out the kanary as its special food. The shell of this nut is so excessively hard that only a heavy hammer will crack it; it is somewhat triangular, and the outside is quite smooth. The manner in which the bird opens these nuts is very curious. Taking one endways in its bill, and keeping it firm by a pressure of the tongue, it cuts a transverse notch by a lateral sawing motion of the sharp-edged lower mandible. This done, it takes hold of the nut with its foot, and, biting off a piece of leaf, retains it in the deep notch of the upper mandible, and, again seizing the nut, which is prevented from slipping by the elastic tissue of the leaf, fixes the edge of the lower mandible in the notch, and by a powerful nip breaks off a piece of the shell. Again taking the nut in its claws, it inserts the very long and sharp point of the bill and picks out the kernel, which is seized hold of, morsel by morsel, by the extensile tongue. Thus every detail of form and structure in the extraordinary bill of this bird seems to have its use, and we may easily conceive that the black cockatoos have maintained themselves in competition with their more active and more numerous white allies by their power of existing on a kind of food which no other bird is able to extract from its stony shell." Dr. Guillemard adds that in New Guinea it is extremely difficult to obtain these birds alive, and that when in captivity their movements are slow and clumsy in the extreme. Moreover, as the pectoral muscles are small and meagre, when compared to the enormous head and beak, it is probable that these cockatoos resort to flight as seldom as possible.

Under the general name of raven cockatoos may be included a group of seven species, which, while agreeing with the last in their black or brown coloration, are distinguished by their completely-feathered cheeks, the more ordinary form of the beak, and the shorter and broader

feathers of the chest. Of this group the Banksian cockatoo (*Calyptorhynchus banksi*), represented in the upper portion of our plate, may be taken as a well-known example. In all these birds the tail feathers are rather long, with the middle ones shorter than those on the sides, and they are crossed by a light-colored transverse band. The beak is characterized by its shortness and depth, and its highly-curved profile. The whole seven species are confined to Australia. The Banksian cockatoo belongs to a group of four species in which there is no light-colored patch on the ear coverts, while in the adult males the band on the tail is red, although more or less tinged with yellow in the young, and perhaps in females of all ages. On the other hand, in the second group, of which the funereal cockatoo (*C. funereus*) is a well-known representative, the ear coverts are marked by a yellow or white patch, while the tail band is of one of these two tints at all ages. The Banksian cockatoo, which measures twenty-four inches in total length, has the general color of a greenish black, with a vermillion tail band. It is confined to Eastern Australia. Writing of a South-Australian species (*C. xanthonotus*) belonging to the group with a yellow tail band, the "Old Bushman" observes that it "was common in our forests from about December, when the old and young birds came down from their breeding places, and remained with us during the winter. They did not breed in our neighborhood [near Port Phillip]; but I think they went to nest very early, for I once shot a female in May with a large egg in her. They principally frequent the

honeysuckles, but are often in the large gums. The old birds are very shy, and have a loud, hoarse call note, or cackle. When they first come, they are in large flocks, and they then always frequented the large honeysuckles, over the tops of which they would fly, or rather float through the air, with a wavering kind of flight, toying and playing with each other, after the manner of the rook at home. As the winter advanced, they appeared to separate, and, although you hardly ever see a single bird, they disperse themselves much more generally over the forests. Their principal food appeared to be large seeds and grubs, and they score the young honeysuckles round with their powerful beaks in search for these latter as if cut with a knife. The young birds are excellent eating." Basing his experience on another species, Dr. Guillemard also vouches for the excellent quality of cockatoo pie.



HEAD OF DUCORPS' COCKATOO.
(From Sclater, *Proc. Zool. Soc.*, 1871.)

Ganga

Cockatoo

The curiously-colored ganga, or helmeted cockatoo (*Callocephalum galeatum*), of Southeastern Australia and Tasmania, differs so decidedly from all its allies as to constitute a genus by itself. The tail, as in the two following genera, is of moderate length and nearly even; while the head and crest of the male are of a flaming red, and the general color of the upper and under parts gray. The cere is peculiar in being feathered, and, while the beak is horn colored, the feet are nearly black. There is a tinge of green on the primaries of the wings. The length of this cockatoo is thirteen and one half inches. It is a shy and forest-loving species, generally leading a solitary life among the topmost boughs of the tallest gum trees, on the seeds of which it subsists.

Typical

Cockatoos

With the exception of the rose-breasted species, in the typical cockatoos, which are those generally kept as pets, the predominant color of the plumage is either white or rosy white, while in the whole of



HEAD OF BLOOD-STAINED COCKATOO.

(From Selater, *Proc. Zool. Soc.*, 1871.)

them the upper mandible has a short hook curving downward nearly at a right angle to its base. The species, fifteen in number, range over Australia and the islands to the north as far as the Philippines, and include the most gorgeously-colored representatives of the family. The crest is subject to considerable variation in form and color, such variations being of the highest importance in the determination of the various species. In the first place, the genus may be divided into two groups, according to the form of the crest. In one of these two main groups the crest feathers are slender and terminate in sharp points which curve forward. One of the best-known representatives of this group is the greater sulphur-crested cockatoo (*Cacatua galerita*) from Australia, in which the feathers of the body are pure white,

the cere naked, the crest sulphur yellow, and the naked skin round the eyes white. This is one of the largest species, measuring from eighteen to twenty inches in total length. In the much smaller lesser sulphur-crested cockatoo, in which the length does not exceed thirteen inches, the body feathers are slightly tinged with yellow, while there is also a patch of yellow on the ear coverts, in addition to that on the crest; this species inhabiting Celebes and some of the neighboring islands. From both of these the citron-crested cockatoo (*C. citrino-cristatus*), from the island of Timor-Laut, is readily distinguished by the orange yellow of the crest. Far more gorgeous than all the others is, however, the beautiful Leadbeater's cockatoo (*C. leadbeateri*) of South Australia, in which the crest is vermilion at the base, with a yellow band traversing this colored area, while the tips of the feathers are white. The cere is also feathered. While the plumage of most of the

upper parts is white, the sides of the head, neck, together with the breast, under parts, and tail coverts are tinged with a pale rose color, being very bright under the wings. In size this species comes next to the greater sulphur-crest, its total length being about sixteen inches.

In the second great group the feathers of the crest, as shown in our figure of the head of Ducorps' cockatoo (*C. ducorpi*s) of the Solomon islands, are broad



RED-CRESTED COCKATOO.
(One-fourth natural size.)

with rounded tips, which do not curve forward. In the larger forms, which correspond in size to the greater sulphur-crested species, the feathers of the crest are very long, and the cere is naked. One of the best-known forms is the great white-crested cockatoo (*C. alba*), from the Halmahera group of the Moluccas, in which the whole plumage is white. Readily distinguished by its vermilion crest the rose-crested cockatoo (*C. moluccensis*), represented in the figure on this page, appears to be

confined to the islands of Ceram and Amboyna. The remaining species are smaller, and have the cere feathered. Most of them have the under surface of the body white, but the red-breasted cockatoo (*C. roseicapilla*) differs from all the other members of the genus in having the whole of the under surface of the body of a brilliant full rose color, and the upper parts gray, the crown of the head being pale rosy white. It is widely distributed in Australia, and measures fourteen inches in total length. The blood-stained cockatoo (*C. sanguinea*) is from North Australia.

Habits

All the cockatoos of this group are gregarious, some of the species, like the greater sulphur-crest, associating in immense flocks, and those who have seen these birds soaring over the trees of an Australian forest bear testimony to the beauty of the spectacle. At times they will ascend in the sky, during the full blaze of a tropical noon, far above the range of the unaided human vision, while at others they may be seen scattered so thickly over a field as to give almost the appearance of a coating of snow. Some years ago it was attempted to naturalize these birds in the woods of Norfolk, but the attempt was to a great extent rendered abortive through their wandering habits, whereby many fell victims to the guns of the idlers of the neighborhood. When flying at such a height in the air as to be invisible to the naked eye, the whereabouts of the flock of great white cockatoos is often revealed on a calm day by the sound of the characteristic cry from which these birds derive their name. This repetition of the syllables *cockatoo-cockatoo* is the ordinary cry of that species, but the harsh, screaming yell, denoting anger or surprise, is only too well known to all who have kept these birds as pets. Their food consists mainly of seeds, but it is probable that in the wild state larvæ of insects form a considerable portion of the diet of many of the species, as in captivity they will readily eat both gnats and flesh. Like most of the parrot tribe, cockatoos do little or nothing in the way of nest-making, generally laying their eggs on the bare wood in some hollow tree. The eggs vary from three to four in number, and usually two broods are reared in a year. In those species which have been bred in Europe, the season extends from May till September. Their elegant plumage, graceful movements, and the readiness with which they are tamed, render cockatoos great favorites as domestic pets, although their discordant cries—worse in some species than others—are a most serious drawback. Writing of the great white cockatoo, Mr. W. T. Greene observes that “occasionally one of these birds will learn to pronounce a few words with tolerable distinctness, but their *forte* lies in the imitation of the barking of dogs, the crowing of cocks, the gabbling of turkeys, and the cackling of ducks, hens, and geese, and more particularly in the rendering, with much fidelity but in an exaggerated key, the outcries of a domestic fowl that has just produced an egg. They may be readily taught to throw up their wings, dance on their perch, hold out their foot to shake hands, and bow their heads in salutation of a visitor.” Not unfrequently these birds can be tamed sufficiently to admit their being allowed to wander at large, and the writer is acquainted with an individual of one of the Australian species which is at times let loose in the garden of its owner. Here the bird will generally remain within accessible distance, although it will occasionally fly to the tops of some tall trees. From such an elevated perch “cockie” will generally descend at the call of its mistress, but occa-

sionally it is obdurate, and cannot be recaptured without much trouble. The rose-breasted species assembles in smaller flocks than most of the other kinds, from which it also differs in its fondness for shade, resting quietly in the tree tops while its white cousins are soaring in the empyrean above during the midday heat. From its splendid colors and engaging ways it would make an attractive pet, were it not that its discordant screams are more piercing and more frequently uttered than are those of its allies.

The slender-billed cockatoos, of which there are two species, one (*Lichmetis nasica*) having a wide range in Australia, while the other (*L. pertinax*) is confined to Western Australia, take their name from the great length and slenderness of the upper mandible, which projects obliquely forward. The former species is represented in the lower figure of the plate on p. 1867, and measures fifteen inches in length, the general color of the plumage being white. The lores and a narrow band on the forehead are, however, red; while the feathers covering the head, neck, and breast are scarlet at the base, and the under surfaces of the wings and tail are washed with yellow. The crest is small, and confined to the front of the head.

The small long-tailed Australian species, known as the cockateel (*Callopsittacus novæ-hollandiæ*), differs so remarkably in appearance from the other members of the family that it has been considered to be an ally of the grass parraquets. Nevertheless, as it has the crest and skull of the cockatoos,



COCKATEEL.

it is referred by Count Salvadori to the present family. It differs from all the other members of the family in its narrow and pointed tail feathers, of which the middle pair are much longer than the others. The male measures about twelve and one-half inches, rather more than half of which is taken up by the tail. Its coloration, without being very striking, is pleasing. The prevailing hue is dark gray, becoming much paler on the upper tail coverts; the forehead and cheeks are lemon yellow, while the feathers of the crest, which cannot be depressed, are yellow at the base and gray above. A bright patch of reddish orange on the ear coverts occupies the middle of the yellow area, and the median and greater coverts, as well as a portion of the secondaries of the wings are ornamented with a broad band of white. The female lacks the brilliant head colors of her consort. The cockateel is found all over Australia, with the exception of Northeastern Queensland, and associates in flocks of considerable size. The female lays from five to seven, or even nine eggs, in the incubation of which the male takes a full share. Strong in its flight, the cockateel is a somewhat restless, and at the same time a noisy bird. Mr. W. T. Greene writes that, "taken when about half-fledged from the nest, and brought up by hand, or rather by mouth, the young male cockateel becomes the most charming pet that can be imagined; in point of fact, there is scarcely any accomplishment that he cannot be taught. He will perform all manner of little tricks, such as kissing his mistress, pretending to be dead, flying out of window, and returning at the word of command; he will also learn to repeat, with great distinctness, not only words, but short sentences, and even to imitate, in a disconnected and rambling fashion, it is true, the chattering of his compatriot, the budgerigar, or the warbling of his rival, the canary." These birds will breed freely in confinement, and they have the advantage of an equable and contented disposition, which enables them to live peaceably with the other inhabitants of an aviary, whether great or small. Indeed, so easy going in disposition is the cockateel, that it will frequently allow itself to be hustled about and bullied by its smaller cousin, the budgerigar, the description of which comes later on in the chapter

THE TYPICAL PARROTS

Family *PSITTACIDÆ*

With the exception of the peculiar owl parrot of New Zealand, the whole of the remaining members of the order are included in a single family, which comprises a far larger number of genera and species than either of the others. The group is one very difficult to define; but, with the exception of the Uvæan parrot and a kindred species, all its members are distinguished from the cockatoos by the absence of a crest; while in the skull the ring of bone is generally imperfect, and if complete it always lacks the posterior process characterizing that part of the cockatoos. The members of this family have a very wide geographical distribution, ranging over the whole of the tropical regions, and being the only representatives

of the order met with in Africa and America. In the Australasian region they are found in association with all the other five families. The family is divided into six subfamilies.

Subfamily *NASITERNINÆ*

New Guinea
Pygmy Parrots is a country of strange creatures, but none of its living products are more remarkable than the pygmy parrots, some of which are actually smaller than an English sparrow. These birds have their beaks shaped as in the cockatoos, with a broad band-like cere, which becomes narrower in the middle line. They are, however, specially distinguished by their short and squared tails, in which the pointed extremities of the shafts of the feathers project beyond the vanes. When folded the long wings reach beyond the end of the tail, and the claws are remarkably elongated. The males of these pygmies are most gorgeous in color, but their consorts show much more sober tints. Altogether nine species of these parrots are recognized. In the species figured above (*Nasiterna pygmæa*), the total length is just over three inches, but it is rather more in the red-capped species (*N. bruijni*).



PYGMY PARROT.
(Natural size.)

THE AMERICAN SHARP-TAILED PARROTS

Subfamily *CONURINÆ*

The pygmy parrots constituting a subfamily by themselves, we come now to a second very large subfamily, exclusively confined to the New World, and ranging from Carolina to Patagonia. These parrots, which include the well-known macaws and the smaller conures, are characterized by their graduated and generally long

tails, in which each of the feathers tapers to a point, and the middle pair are longer than any of the others. The bill is strong, almost always deeper than long, and generally devoid of any notch, while its usual color is whitish or pale brown. Except in one genus, the two sexes are alike, and the predominant color of the plumage is usually green, although in some species blue or yellow. The cere, which may be either naked or feathered, surrounds the whole base of the bill like a band, and the nostrils may be either exposed or concealed among the feathers. In the skull the ring round the socket of the eye is generally complete. As there are no less than fifteen genera in the group, only some of the more interesting can be noticed.



RED-CAPPED PYGMY PARROT.

(From Guillemard's *Cruise of the "Marchesa."*)

**Hyacinthine
Macaw**

From their large size, the length of their tails, and the gorgeous tints of blue, red, and yellow adorning their plumage, the macaws are the most showy and conspicuous of all the parrots, but they have the disadvantage of being the most noisy of the whole confraternity, and are therefore far from being desirable in the house. By many writers the whole of them are included in a single genus, but Count Salvadori considers that they may be divided into three generic groups. The hyacinthine macaw (*Anodorhynchus hyacinthinus*) from Central Brazil, of which a figure is given on the left side of our colored plate, is the best-known representative of a small genus, characterized by the general color of the plumage being blue both above and below, while the lores are feathered. In the figured species the whole plumage is of a nearly uniform cobalt blue, becoming a little lighter on the head and neck, and somewhat duller below, while the under surfaces of the wings and tail are black. In marked contrast to the prevailing azure, stands out the yellow of the naked skin surrounding the eye and at the base of the lower jaw. The black beak is of unusually large size, even for a macaw, and the



MACAWS.

feet are blackish. The total length of this fine bird is about thirty-four inches, of which twenty and one-half are taken up by the tail. The hyacinthine macaw is a somewhat rare species, and although inhabiting the dense tropical forests affected by the other macaws, it is said by Azara to differ markedly in regard to its breeding habits. In place of building in some hollow tree, it is stated to scoop out a burrow on the bank of a river, where it lays a pair of eggs; two broods being reared in a



HYACINTHINE MACAW.
(One-fifth natural size.)

season. These birds—the ararauna of the natives—fly, according to Bates, in pairs, and feed on palm nuts, which, although so hard as to be difficult to break with a heavy hammer, are crushed to pulp by their beaks. The skulls of the hyacinthine macaw and its congeners differ from those of ordinary macaws in the incompleteness of the bony ring round the eye. The same feature is probably also characteristic of

Spix's macaw (*Cyanopsittacus spixi*), which, although agreeing with the ararauna in its blue coloration, differs by the naked lore, on which account it is regarded as representing a distinct genus.

The true macaws differ from the preceding in the absence of blue on the under part of the body, and also by the completeness of the bony



HEAD OF MACAW.

ring in the skull round the eye. In all of them the lores, as well as a larger or smaller area of the cheeks, are devoid of feathers. The range of these splendid birds, which are locally known as araras, extends from Mexico to Bolivia and Paraguay, certain species ranging in the Andes to elevations of some ten thousand feet above the sea.

Of the fourteen recognized species, a few of the better known will alone be mentioned. Among these the red-and-blue macaw (*Ara macao*), represented on the right side of our

colored plate, is one of the handsomest. In this species the general color of both the upper and under parts is vermillion red, while the upper wing coverts are chrome yellow, the lower part of the back, the rump, upper and lower tail coverts, together with the quills of the wings being blue. The tail feathers are scarlet, with more or less blue at their tips (except in the central pair) and on their outer edges, the outermost being almost wholly blue. Beneath, both the tail and wing feathers are golden red, while the greater and upper median wing coverts, as well as the scapulars, are yellow tipped with green. In size this splendid bird attains a total length of three feet, nearly two of which are taken up by the tail. Its range is large, extending from Mexico to Guiana and the Amazon valley. In marked contrast to the above, is the coloration of the blue and yellow macaw (*A. ararauna*), depicted at the top of our plate. In this bird while the upper surface of the body, wings, and tail is blue, almost the whole of the under parts are yellow, while the throat is marked by a broad black gorget. The crown of the head is grass green, and the contrast of the light blue of the feathers of the back with the dark blue of the quills of the wings is very pleasing. This species, which is smaller than the last, is also widely distributed in tropical America, ranging from Panama to the Amazon valley. A third type of coloration is presented by the still smaller military macaw (*A. militaris*), in which, as in the majority of the species, the prevalent tint is green. The forehead is, however, scarlet, while the lower part of the back, the rump, and the upper tail coverts are light blue. Blue also appears on the quills of the wings, as well as on the primary and outermost greater wing coverts; while in the tail the four middle feathers are brownish red tipped with blue above, and the outer ones largely blue. The length of this species is only twenty-seven inches, and its range extends from Mexico to Peru and Bolivia.

Habits.

All the macaws of this genus are denizens of the dense forests of tropical America, associating in flocks, and feeding on fruits, seeds, and nuts. Bates compares a flock of the red-and-blue species, feeding on the fruits of a palm tree, to a cluster of flaunting banners suspended beneath its crown. When on the wing, such flocks make the air resound with their loud harsh screams. In the fruit season, Waterton describes the palms in the neighborhood of the Macoushi country as being sometimes absolutely covered with these birds, and states that any number may be killed with the blowpipe and arrows. They all nest in the hollows of trees, which they enlarge according to their requirements. The eggs, usually two, but occasionally three in number, are about the size of those of a hen, but less pointed. Both males and females take their share in the incubation, and there are usually two broods in the year. Not unfrequently the whereabouts of a macaw's nest is betrayed by the protruding tail of the sitting bird. Macaws awake from slumber with the first streaks of dawn, and at once commence their deafening clamor, the whole flock generally repairing to some common meeting place, where they open their wings and warm themselves in the sun's rays. Soon, the flock departs to its feeding ground, which may be either in the forest or among the cultivated lands. Feeding is continued till about ten o'clock, after which the host repairs to a neighboring stream to drink and bathe. Toward noon the macaws seek the deepest shade of the forest, where they spend the hottest hours of the day, till the declining sun once again calls them forth. Before settling down to roost for the night, the flock, after the manner of rooks, assembles at the meeting place—usually some large bare tree. Most of the macaws can be readily tamed, and will live in captivity for long periods. They are, however, but poor talkers, and never give up their pernicious habit of screaming. Moreover, although properly-tamed birds seldom attempt to bite adults, many of them cannot safely be trusted where there are children.

Conures

Next to the macaws, the best-known representatives of this sub-family are the smaller parrots, termed, from the form of the tail, conures, most of which are included in the genus *Conurus*, although our figured example (*C. carolinensis*) is the sole representative of the distinct genus *Conuropsis*. The conures differ from the true macaws by the lore being feathered, and they are further characterized by the rather swollen form of the beak, which is not in the least degree compressed, while the lower mandible is broad and not grooved. In the typical conures, or those included in the genus *Conurus*, the fourth primary feather of the wing is attenuated, and the nostrils are exposed, whereas in the Carolina conure (*Conuropsis*) the corresponding feather is not narrowed, and the nostrils are concealed among the feathers covering the cere. Various shades of green, yellow, and orange may be described as the prevalent colors of the conures, although there is frequently more or less blue on the quills of the wings, while there may be red on the head and breast; the under parts are, however, never blue. In the Carolina conure, which measures twelve and one-half inches in length, the general color is green, becoming yellowish on the under parts, while the forehead and cheeks are orange red, and the rest of the head and neck bright yellow. Spots of orange red with patches of yellow adorn the shoulders, and the outer webs of the

quills are bluish green, becoming yellow at the base. The true conures, of which there are no less than twenty-eight species, range from Mexico, through Central America and the West Indies, to Bolivia and Paraguay. Formerly, the Carolina conure had a more northern range than any other parrot, extending to Iowa, the Great Lakes, and New York, but it is now confined to the States bordering the Gulf of Mexico and the Mississippi valley, and is very local. At one time they were found in enormous flocks, which used to do great damage to the crops, but of



CAROLINA CONURE.
(One-half natural size.)

late years their numbers have been greatly reduced. Wilson writes that the Carolina conures "are particularly attached to the large sycamores, in the hollows of the trunks and branches of which they generally roost, thirty or forty and sometimes more, entering at the same hole. Here they cling close to the sides of the tree, holding just by the claws and also by the bill. They appear to be fond of sleep, and often retire to their holes during the day, probably to take a regular siesta. They are extremely sociable and fond of each other, often scratching each

other's heads and necks, and always at night nestling as close as possible to each other, preferring at that time a perpendicular position, supported by their beak and claws." They lay from three to five eggs, and, if taken young, are readily tamed. The golden conure (*C. solstitialis*), of Guiana, is golden yellow with the exception of parts of the wings which are green and blue.



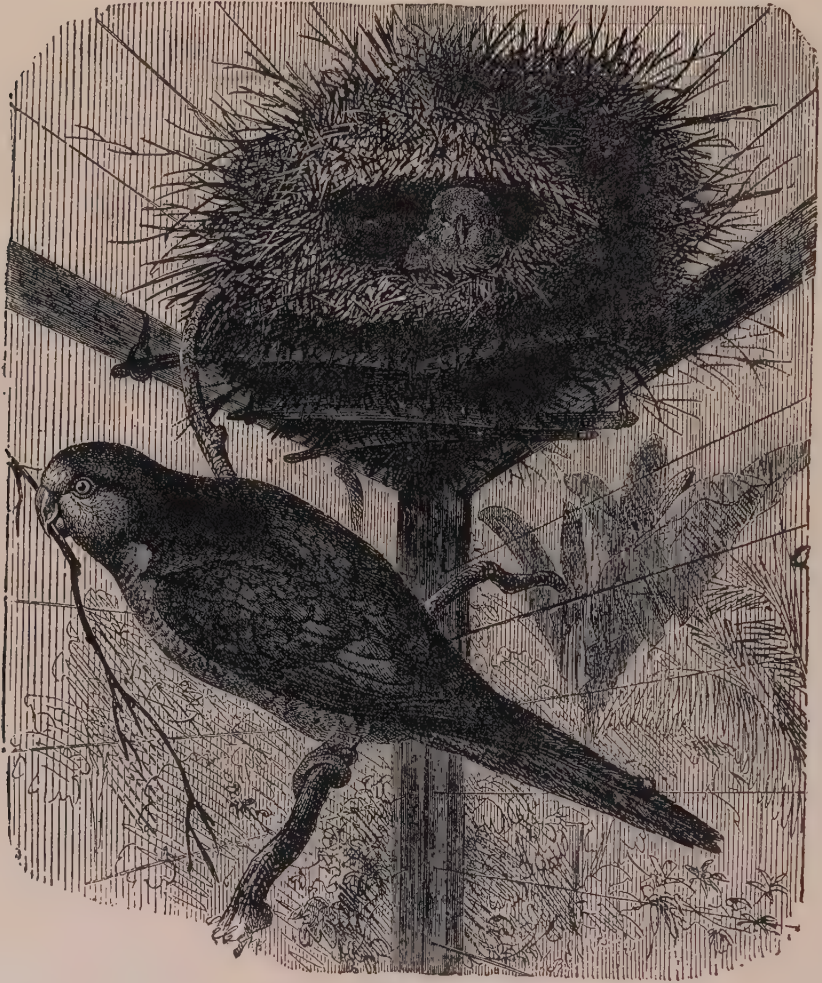
SLIGHT-BILLED PARRAQUET.

(Two-fifths natural size.)

**Slight-Billed
Parraquet**

The great length and comparative straightness of the upper mandible of the parrot represented in the illustration, serves to distinguish it at a glance from all its kindred. This bird is the slight-billed parraquet (*Henicognathus leptorhynchus*), the sole representative of its genus, and restricted to Chili, where it appears to be abundant. It is about fifteen inches in total length, and the general color of its plumage is dull green, becoming somewhat brighter on the top of the head, in which region each feather has a dusky edge. This color is relieved by dull crimson on the forehead, lores, and round the eyes; and there is a faint patch of dull red on the abdomen, and some

amount of bluish tints on the wings. The iris of the eye is orange, while the beak and feet are lead color. These parrots are met with in large flocks, which may number hundreds or thousands of individuals, and keep up an incessant screaming. For a part of the year they inhabit the forests, but from October to April they make their appearance in the cultivated districts of Valdivia, for the purpose of feeding on the crops. At this season they appear every



GRAY-BREASTED PARRAQUET.
(Two-fifths natural size.)

morning in large flocks flying from the northward, and returning in the evening. With their long beaks they extract the grains of maize and wheat from the growing crops, and also dig up roots of grass, which form their staple food. Indeed, they are more terrestrial than arboreal in their general habits, although they nest in hollow trees. It is but seldom that these parrots are brought alive to Europe.

Gray-Breasted Parraquet The gray-breasted parraquet (*Myopsittacus monachus*) belongs to a group of genera, distinguished from the three preceding ones by the bony ring round the eye being incomplete; this particular genus being characterized by the beak being rather swollen at the sides and rounded above, as well as by the tufted oil gland, and the concealment of the nostrils by the forward projection of the feathers at the base of the beak. The general color of this parrot is green, with the upper part of the head, lores, cheeks, throat, and breast gray; the under parts yellowish green, and the primary feathers and wing coverts blue, edged with green on their outer webs. The bill is reddish white, the iris brown, and the foot gray. The total length of the bird is eleven and a half inches. It is a native of Bolivia, Paraguay, Argentina, and Uruguay. The most interesting point in connection with this parrot is its habit of building nests in trees, whereby it differs from all other members of the order, our illustration representing one of these nests built by a pair in captivity in one corner of their cage. Darwin states that these birds in Parana select tall trees in which to build, and that a number of nests are placed so close together as to form one great mass of sticks. They always associate in immense flocks, and commit great ravages on the corn crops. On this account they are much persecuted by the inhabitants, Darwin relating that as many as two thousand five hundred of these birds were killed near Colonia in the course of a year. In some districts the nests are constructed in the trees growing in swamps, and attain a huge size, each nest generally having several entrances, and being frequented by two or three pairs of birds. On this account the name of swamp parrot is frequently applied to the species. From observations made on captive specimens, it appears that although the cock aids in building the nest, the work of incubation is performed by the hen alone, the usual number of eggs being two.

Nearly allied to this species are several South-American parrots constituting the genus *Bolborhynchus*, distinguished from the one under consideration by the nostrils being exposed and opening in a much swollen cere, from which the name of the genus is derived. These parrots range from Mexico to Northern Chili and the Argentine, a well-known species being the Aymara parraquet (*B. aymara*).

Parrotlets The smallest representatives of this subfamily are the pretty little green and blue birds, which may be termed, from their Latin name, parrotlets, and occupy a position in this section analogous to that held by the love birds in the parraquet group. The largest of these parrotlets is only five and one-half inches in length, while none of the others exceed five inches. They differ from all the other members of the subfamily in the relative shortness of their tails, and also in that the two sexes are unlike, while their skeletons are distinguished by the absence of the furcula. They range from Mexico to Bolivia and Brazil, and are divided into three groups, according to the color of the rump in the male. In the first group, as represented by the blue-winged parrotlet (*Psittacula passerina*), the rump is ultramarine blue; in the second (*P. speugeli*) it is turquoise, and in the third (*P. guianensis*) green. We may remark here that the reader will scarcely fail to notice what a number of members of the parrot tribe are restricted to the Southern Hemisphere, where they are especially numerous in South America,

Australia, and the Papuan islands. This has been taken to indicate that these birds constitute an originally southern group, although it is much more probable

that they were primarily developed in the Northern Hemisphere.



BLUE-WINGED PARROTLET.

Our All-Green Parraquet last example of the subfamily is the all-green or tirika parraquet (*Broto-gerys tirica*), representing a genus with several species, distinguished by the long tail, the somewhat compressed form of the beak, in which the nostrils open in a completely-

naked cere, and the absence of a tufted oil gland. The species figured on the opposite page is the largest of the genus, measuring ten inches in total length, whereas some of the others are less than seven. It takes its name from the all-pervading green of the plumage, to which the only exceptions are the blue primaries and primary coverts, a slight tinge of olive brown on the lesser upper wing coverts, and of blue on the middle tail feathers. This species is an inhabitant of Eastern Brazil; the range of the genus extending from that country, Peru, and Bolivia, to Central America. In Eastern Brazil the tirika is one of the commonest of the parrot tribe, associating in countless flocks, which may be seen flying from grove to grove, or descending to ravage the rice and maize fields. Their cry is a short, sharp, clear scream. In captivity these parraquets thrive well.

BLUNT-TAILED GREEN PARROTS

Subfamily *PIONINÆ*

The familiar Amazon parrots are among the best-known representatives of a large subfamily, containing several American genera and also a single African one. All these parrots are distinguished from the members of the preceding subfamily by their broad and short or moderate tails, which are never of the acuminate and pointed form characteristic of the conures, and have the tips of the feathers rounded. In the whole of them the cere is entirely naked, and the predominant

color of the plumage green. Usually the tail is about half the length of the wing, and may be either squared or rounded at the end, and the bill is of moderate strength, sometimes rather longer than deep. The New-World forms are all of them tropical.



ALL-GREEN PARRAQUET.
(One-half natural size.)

**Amazon
Parrots**

The Amazon parrots, of which there are over forty species, are mostly comparatively-large birds, sometimes exceeding seventeen inches in length, and range from Mexico to Argentina, although especially characteristic of the great river valley from which they take their name. They are characterized by the tail being of moderate length and rounded, with the under coverts always green, and also by the absence of a tufted oil gland, as well as by the completeness of the bony ring round the eye. One of the best-known species is the festive amazon (*Chrysotis festiva*), from the Amazon valley, which is a green bird with a red frontlet, a line of blue above and behind the eye, the back and rump

red, and the bastard wing, together with the primary wing coverts and the outer webs of the primaries, deep blue. Most of the species are distinguished from one another by the markings of the head and face, while a few differ by their smaller size. They are all essentially forest-dwelling birds; associating in flocks, and feeding upon the fruits of palms and other trees. They usually lay from three to four eggs, and produce but one brood in the year. If taken sufficiently early the young are extraordinarily tame, and as these birds are very hardy, they are favorites in captivity, more especially as many of them rival the gray parrot in talking and mimicry. Indeed, the festive amazon frequently becomes sufficiently domesticated to be allowed to wander in gardens at large.



HAWK-BILLED PARROT.
(One-fourth natural size.)

**Hawk-Billed
Parrot**

One of the most remarkable members of this subfamily is the hawk-billed parrot (*Deropterus accipitrinus*) of Guiana, the Amazon valley, and Northeast Brazil, which is the sole representative of its genus. It differs from the amazons by the presence of a tufted oil gland, and by the relatively longer tail, and is specially characterized by the beak being rather short, and deeper than long, but above all by the elongation and breadth of the feathers on the hinder part of the neck, which form an erectile collar or ruff. The coloration of this extraordinary bird is very striking. While the back and upper surface of the wings

are green, the head is brown, with hoary streaks on the sides; the elongated feathers of the nape, together with those on the abdomen and breast are dark red, with blue edges, and the bastard wing, primaries, and primary coverts are black. The tail feathers are green, tinged with blue near the tips, and below both the tail and wings are black. The color of the bill is dusky horn, the iris is brown, and the feet are black. In length this bird measures about fourteen inches. In repose, the elongated feathers of the nape are depressed, and it is only when the bird is excited or angry that the ruff is raised in the manner depicted in our illustration. But little is known of this parrot in its native state, beyond the fact that it is an inhabitant of dense forests, and is far less common than most other species. It is frequently found on the sawari palms, and its cry is described as of piercing shrillness. The usual number of eggs laid is stated to be four. Although but rarely exported to Europe, the hawk-billed parrot, according to Mr. W. T. Greene, is an admirable bird as a pet, being very hardy, agile and graceful in its movements, readily tamed, and almost as good a talker as the gray parrot.

Passing by the other American representatives of the present sub-family, brief mention must be made of the African genus *Poicephalus*, which contains several medium-sized parrots, with rather short tails, and the bill very short and deep, especially as regards its lower mandible, in which the depth exceeds the length. These parrots are found throughout Africa south of the Sahara, and agree with their American cousins in the general green hue of their plumage; well-known examples being Levaillant's parrot (*P. robustus*) of South Africa; Jardine's parrot (*P. guliemi*) from the west coast, and the brown-headed parrot (*P. fuscicapillus*) from Zanzibar. In the second of these, while the general hue is green, the feathers of the back are black, edged with green; the tail feathers and primaries black, and the other wing feathers like those of the back. These colors are relieved by red on the front of the head, the bend of the wings, and legs. The whole length of the bird is about eleven inches. All are readily tamed, and may be often trained to talk fairly well.

Subfamily *PSITTACINÆ*

This second group of short-tailed parrots, which are mainly confined to Africa and Madagascar, although represented by one genus in New Guinea, are readily distinguished from the members of the preceding subfamily by their prevalent color being either gray or black, with or without an admixture of red. The sides of the head are more or less naked, the bill is never red, and in the skull the bony ring round the eye is always incomplete. The cere is broad, but narrows toward the nostrils, which it does not inclose in a swelling; while the bill is without a notch, and has its lower mandible longer than deep. The tail may be either square or rounded, and is sometimes rather more and at others rather less than half the length of the wing.

Such a universal favorite as the common gray parrot (*Psittacus erithacus*)—the type of the whole order—scarcely requires description, as its appearance is familiar

Gray Parrot to all. It may be mentioned, however, that it is characterized by the squared tail being less than half the length of the wing, by the rather compressed and lengthened bill, and by the papillæ covering the naked portions of the face. The general color of the plumage is ashy, with a bright red tail. The range of this species extends from the Congo and Guinea coast across Equatorial Africa to the east of Lake Nyassa. In Liberia and lower Sierra Leone it is replaced by *P. timneh*, distinguished by its dark gray plumage, and the dark red of the tail. The best account extant of the habits of the gray parrot in its wild state is one by Mr. J. G. Keulemans, who had an opportunity of studying these birds during a long



THE GRAY PARROT.
(Two-fifths natural size.)

residence on Prince's island, where they especially frequent a hill, known as the Pico do Papagaio. Mr. Keulemans writes that "these parrots are always found in flocks which go about the island during the day, returning to their own appointed place on the mountain in the evening to roost. Their food consists of fruits, such as the palm nut, the avocat, the banana, goyave, mango, and many other fruits of a smaller kind, but they always give the preference to the palm nuts. They drink but little, and as no water is found on the Pico, they must obtain what they require during the day on the lowland. They make no nest, but deposit their eggs (which are from two to four in number) on the bottom of the hole. The eggs are in size,

shape, and color similar to those of the wood pigeon; when unblown they are of a pinkish hue, which may be owing to the thinness of the shell. Both birds take turns to sit, and while one is sitting the other often comes and feeds it out of its crop. The young ones are fed in the same way. In time of danger the old birds defend their progeny vigorously, and should the enemy prove too strong to be successfully resisted by one, other parrots come up to their assistance, and, joining forces, either kill or put the aggressor to flight. The gray parrot delights to dwell in companies; many nests are found within a few feet of each other, and often in one tree two or more holes may be seen occupied by hatching pairs. The young birds are covered with a long and fluffy down, which afterward, when molting, falls off. Their first plumage is darker, and the iris dark gray, instead of pale yellow. They leave the nest when about four weeks old, but may be seen looking outside the hole some time before they are able to fly." In captivity this parrot is the best of talkers, and, did space permit, many interesting anecdotes might be quoted relative to this accomplishment. Contrary to what usually prevails among higher bipeds, the male is commonly the more voluble and fluent speaker of the two, although the female pronounces her words more distinctly. Like most parrots, this species attains a great age, and there seems no doubt that examples have been kept in captivity for periods of between sixty and eighty years. Whether, however, they have lived in this state for upward of a century, as reported, seems doubtful. The anecdote of the old lady of eighty, who purchased a parrot with the view of testing by experiment the truth of such report, is probably well known to our readers.

Vasa Parrots Five peculiar parrots inhabiting Madagascar and certain neighboring islands, constitute a genus easily recognized by their black or blackish-brown plumage, which gives them at a distance somewhat the appearance of crows. The region round the eye is naked, the lore also partially bare, and the whitish bill somewhat thickened and swollen. The greater vasa (*Coracopsis vasa*) attains a length of about twenty inches. Although common in their native islands, very little is known of the habits of these parrots in the wild state. The few that are brought to Europe are readily tamed, and soon learn to talk.

New Guinea Black Parrot This species (*Dasypterus perqueti*) is distinguished from its Malagasy allies by its longer and shallower beak, and the larger amount of bare skin on the sides of the face. The general sable hue is relieved by a red band on either side of the back of the head; while the under wing coverts are likewise red

THE PARRAQUET GROUP

Subfamily PALÆORNITHINÆ

The true parraquets, together with the love birds and certain other allied forms, constitute a fifth subfamily, confined to the Eastern Hemisphere, but exceedingly difficult to define from external characteristics. All of them differ, however,

from the members of the foregoing groups, except the pygmy parrots, by certain peculiarities connected with the course of the carotid arteries. As a rule, the females are markedly distinct from the males, which, with the exception of the parrotlets, is not the case in the preceding groups; the tail feathers are frequently pointed, and the sides of the head are either completely feathered, or only naked just round the eyes. The bill is often very strong, and frequently, especially its



RED-SIDED ECLECTUS.
(One-fourth natural size.)

upper moiety, red in color. In the skull the ring round the eye is incomplete. The cere is always narrow, surrounding the whole base of the bill with a band of equal width, and is generally partially feathered; while the nostrils may be either exposed or concealed. The group ranges over the Oriental, Ethiopian, and Australasian regions.

Eclectus
Parrots

The Moluccas and Papuan islands are the home of a genus of parrots of this group, of which the typical red-sided eclectus (*Eclectus pectoralis*) exceeds the green parrot in size; its total length being from sixteen to eighteen and one-half inches. In this genus the bill is thick, notched, and very deep, with its lower mandible marked by a keel along the middle line of the symphysis. The tail is of moderate length and nearly squared, with its central feathers of normal form, and the nostrils are hidden. In the females the general hue of the plumage is red, while in the males it is green.

So different are the two sexes of the red-sided eclectus, that it is at first sight difficult to believe that they belong to the same species. In the female, the beak is black and the eye yellow; the plumage of the head and upper parts of the neck and breast is rich crimson red; a band across the upper part of the back, the lower breast and abdomen, as well as the edge of the wing and under coverts, are blue; the back, rump, upper tail, and wing coverts, and the secondaries are blood red; the primaries and their coverts are blue, edged with green on their outer webs; while the tail is blood red above, and more dusky beneath. In the more soberly clad male, the general green hue is relieved by red on the axillaries and under wing coverts; while there is blue on the angle of the wing, and the primaries and their coverts; the under surface of both the wings and tail feathers being black. In the beak the upper mandible is vermilion, and the lower one black. No adequate conception of the gorgeous coloration of these birds can, however, be conveyed without the aid of colored illustrations. This splendid parrot ranges from the Aru islands through New Guinea to the Solomon islands; but, as with its allies, scarcely anything is known concerning its habits in the wild state. In captivity it is readily tamed; but its chief attraction lies in its brilliant plumage, as its movements are listless and devoid of interest, and it is at times subject to fits of deafening screaming.

True
Parraquets

All who have traveled or resided in India are familiar with the flights of long-tailed parraquets which swarm in every jungle, and form one of the most characteristic features of an Oriental landscape. These parraquets, of which there are many species, belong to a genus ranging from Africa north of the Equator, through Mauritius and the Seychelles, to India, Burma, the south of China, and Malaysia, and taking its name from the circumstance that one of the species was brought to Europe by Alexander the Great from the Punjab. They are characterized by the long and graduated tail, in which all the feathers, but especially the middle pair, are narrow; and by the presence of a notch in the upper mandible; while very frequently there is a rose-colored collar round the neck, at least in the males. The general hue of the plumage is green; but while in one large group the head is of this color, in a second it is only partially green, or not green at all. The best-known species is the ring-necked parraquet (*Palæornis torquatus*), belonging to the former group, and ranging from India to Cochin China. In length, this bird varies from sixteen to seventeen inches, of which from nine and a half to ten are taken up by the tail, and while its general color is green, the neck of the male is ornamented with a rose-red collar, incomplete in front, above which is a black ring incomplete behind. Far

handsomer, however, is the Indian blossom-headed parraquet (*P. cyanocephalus*), in which the head of the male is red, tinged with plum color on the sides and back, and defined by a narrow black collar, while the middle feathers of the tail are blue. The following account of the habits of the Indian ring-necked species is given by Jerdon, who writes that it frequents "cultivated grounds and gardens, even in the barest and least wooded parts of the country, and it is



ROSY-FACED LOVE BIRDS.

(Three-fifths natural size.)

habitually found about towns and villages, constantly perching on the house tops. It is very destructive to most kinds of grain, as well as to fruit gardens. When the grains are cut and housed, it feeds on the ground, on the stubble corn-fields, also on meadows, picking up what grains it can; and now and then takes long flights, hunting for any tree that may be in fruit; and when it has made a discovery of one in fruit, circling round, and swirling with outspread and down-

pointing wings till it alights on the tree. It associates in flocks of various size, sometimes in vast numbers, and generally many hundreds roost together in some garden or grove. It breeds both in holes in trees, and very commonly, in the south of India, in old buildings, pagodas, tombs, etc. It lays four white eggs. Its breeding season is from January to March. Its ordinary flight is rapid, with repeated strokes of the wings, somewhat wavy laterally or arrowy. It has a harsh cry, which it always repeats when in flight, as well as at other times." These parraquets are readily tamed, and in India will breed in that state. If well trained, they are fairly quiet; but if their tempers have been unduly tried, they are wont to exercise their powers of screaming.

Love Birds The pretty little parrots (of which a group is represented in our illustration), commonly known as love birds, derive both their popular and scientific titles on account of the attachment the pairs appear to entertain for one another. Mr. W. T. Greene remarks, however, that a single bird will live in captivity for years without any apparent signs of pining, and will actually become more attached to its owner than if it formed one of a pair. And he adds that the reason why if one of a pair dies the other generally soon follows its companion, is that the constitutions of the two have been undermined by the hardships of the voyage to Europe; thus demolishing the pretty fable that the death of the survivor of a pair is due to inconsolable grief at the loss of its mate.

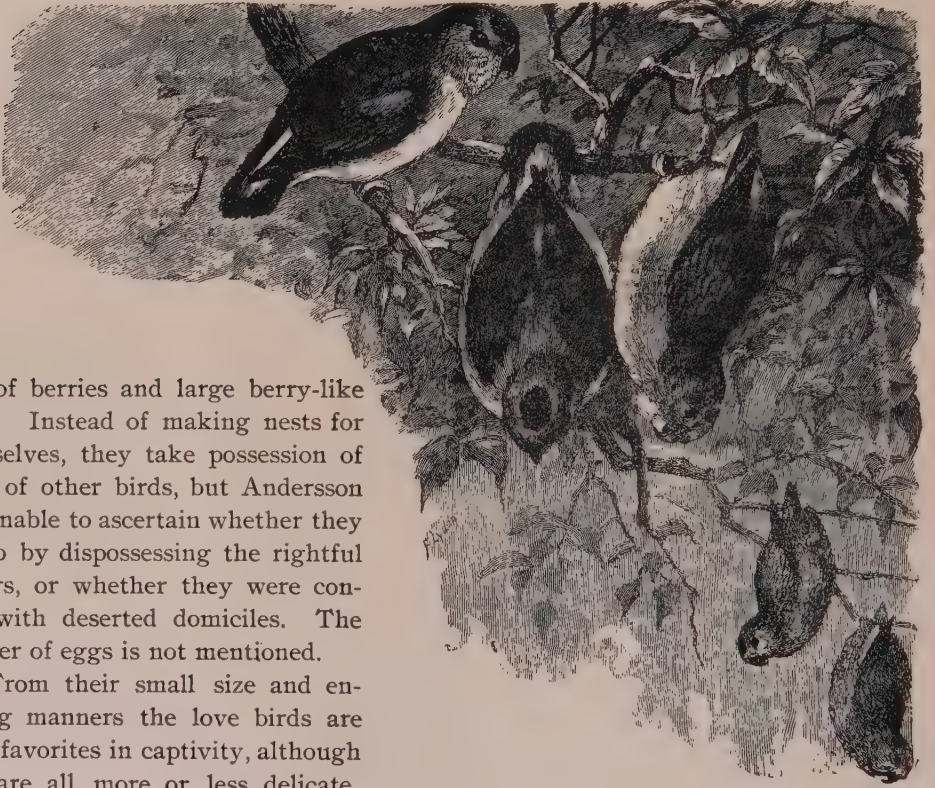
The love birds, of which the largest does not exceed six and one-half inches in length, differ from all the other members of the subfamily, in that the thick and deep beak has no ridge along the inferior surface of the symphysis of its lower mandible; and they are further distinguished by the shortness of the tail, which is marked with a black band near the extremity. Their skeletons are peculiar, in that the furcula is absent. In the latter respect, as well as in their small size, and the occasional difference in the coloration of the two sexes, the love birds resemble the American parrotlets (p. 1883), with which they have frequently been classed. They may, however, be at once distinguished from the latter by their rounded instead of pointed tail feathers. The love birds, of which there are seven species, are confined to Africa south of the Sahara and Madagascar, although they have been introduced into the Mascarene islands. The rosy-faced species (*Agapornis roseicollis*) belongs to a group in which the rump and upper tail coverts are blue



GRAY-HEADED LOVE BIRDS.

and the under wing coverts green. In both sexes the general color is green, becoming yellowish beneath; the rump and upper tail coverts being light blue, the forehead bright red, and the sides of the face and throat rose color. This species inhabits Southwestern Africa from Angola to Namaqualand, and is also reported from the opposite side of the continent, in the neighborhood of the Limpopo. The two sexes are almost undistinguishable in this species.

Andersson writes that these love birds are common in Namaqualand, and are met with in small flocks, never far removed from the vicinity of water. Their flight is rapid, and while on the wing they utter their sharp cry. Their food con-



sists of berries and large berry-like seeds. Instead of making nests for themselves, they take possession of those of other birds, but Andersson was unable to ascertain whether they did so by dispossessing the rightful owners, or whether they were content with deserted domiciles. The number of eggs is not mentioned.

From their small size and engaging manners the love birds are great favorites in captivity, although they are all more or less delicate. The rosy-faced species is, however, the most hardy, and will readily

A GROUP OF HANGING PARROTS.

breed in confinement, often producing two broods in the year. That love birds have not always the angelic disposition commonly attributed to them is indicated by the following extract from a correspondent of Mr. Greene's, who writes, that "I have a red-faced love bird, to which it would puzzle you to apply the epithet 'amiable,' for a more surly, ill-tempered little glutton never existed. She quarrels with her husband, whom she drives about, compels to feed her with partly-digested food from his craw, and then thrashes if he does not sit closely enough to her, or if he dares to move before she is ready. In fact, a more hen-pecked wretch

never lived, and yet he seems to like it, and to be specially proud of his beautiful, but utterly unamiable wife."

**Hanging
Parrots**

The last group of this great subfamily is formed by the curious hanging parrots,—so called from their habit of sleeping head downward, suspended by their feet from a bough. These parrots, which are about the same size as love birds, comprise twenty species, ranging from India and the Philippine islands through the Malayan region as far east as Duke of York island. They differ from all the other members of the subfamily in the thinness



BLUE-CROWNED HANGING PARROTS ASLEEP.
(Two-thirds natural size.)

of the beak, in which the length exceeds the depth; the upper mandible being long and but little curved, while the profile of the lower one slopes upward with very little convexity. In all of them the under surface of the remiges and tail feathers is of a bright verditer blue. They are brilliantly colored, with green as the predominant tint, and Dr. Guillemard describes a species from the Sulu islands (*Loriculus bonapartei*) as looking like a little glowing ball of vivid crimson, yellow, and green. The blue-crowned species (*L. galgulus*), here figured, is an inhabitant of the Malay Peninsula and Islands, and measures just over five inches in total length.

In the male the general color is green, with a deep blue spot on the top of the head, another of yellow on the interscapular region, a broad band of yellow across the lower part of the back, the rump and upper tail coverts scarlet, and a patch of the same color on the throat. The female is duller.

As might be inferred from the conformation of their beaks, all the hanging parrots are flower suckers, subsisting largely on honey, although they also eat flower buds and young shoots. The Indian species (*L. vernalis*) is usually found in open spaces in the forests, where it associates in small flocks. When feeding, it keeps up a continual chirping cry; and it is said, like the fruit bats, to be at times taken in a stupefied condition, lying beneath the pots suspended to catch palm juice. They appear to pass a large portion of their time in sleep, but when awake exhibit marvelous activity in climbing. From the nature of their food, these little parrots are not well adapted for captivity, although they can be kept on a diet of rice boiled in milk and well sweetened, with the addition of fruit and ants' eggs. Mr. Greene says that if several are kept in a cage, they will hang suspended side by side from the roof for hours at a time, in which position they will caress and feed one another.

THE BROADTAIL GROUP

Subfamily *PLATYCERCINÆ*

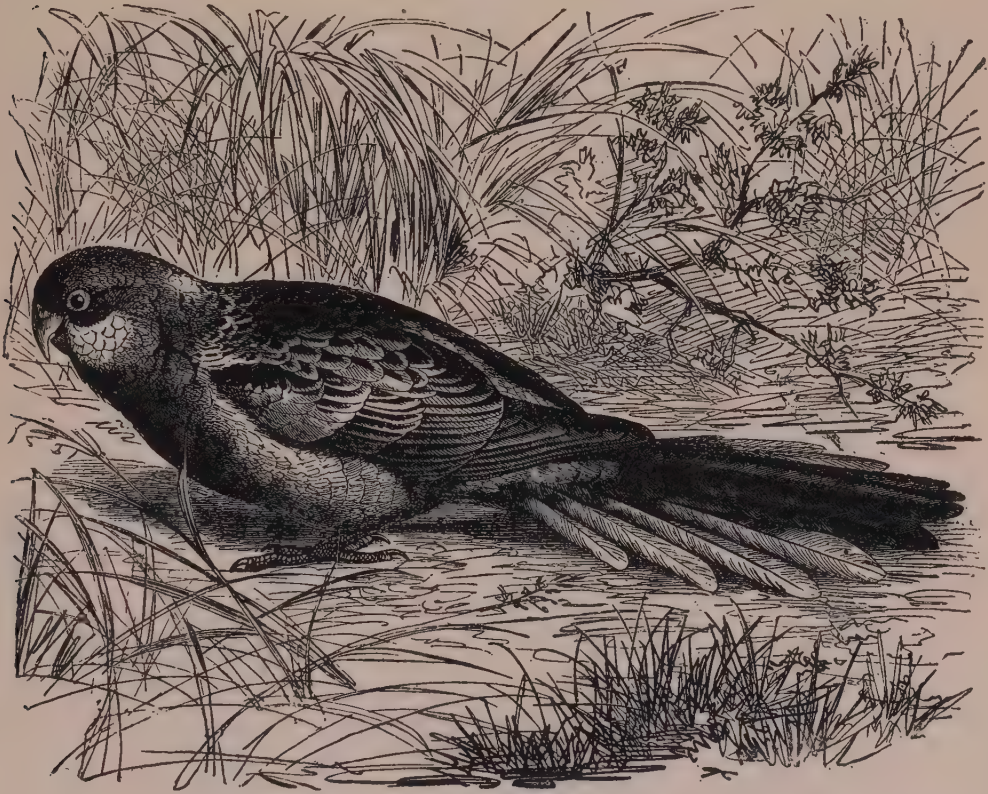
The last subfamily of the *Psittacidae* is represented by the broadtails, grass parraquets, and their allies, and is entirely confined to Australia, New Zealand, New Caledonia, and the Society islands. They are distinguished from all the preceding groups, with the exception of the parrotlets and love birds, by the absence of the furcula,* while in the skull the ring round the eye is incomplete. The tail is rather long, graduated, and often pointed, and the beak of moderate size, and never red in color. The cere is small, merely surrounding the nostrils; the beak short and thick, with the lower mandible generally concealed by the feathers of the cheeks, and the plumage much variegated.

The broadtails, of which the best-known example is the Rose Hill broadtail, or Rosella parraquet (*Platycercus eximius*), take their name from the breadth of the tail feathers, which are not acuminate. The bill is distinctly notched, and the feathers of the back are black, with broad, light edgings, and presenting a general scale-like appearance. The genus, of which there are thirteen species, is restricted to Australia, Tasmania, and Norfolk island.

The Rose Hill broadtail is one of the handsomest of the Australian parrots, and belongs to a group of three species, in which the cheeks are white and the head red. Its coloration may be briefly indicated by saying that the head, neck, and breast are red; the cheeks white, the nape yellow; the feathers of the back black, with greenish-yellow borders; the rump, upper tail coverts, and lower part of the

* The single species of *Naunodes* is an exception in this respect, while it also differs from all other *Psittacidae* in its brush-like tongue.

abdomen yellowish green, and the lower breast yellow, with a scarlet band in the middle. A large portion of the wings is blue, and while the two middle tail feathers are green, tipped with blue, the outer ones are darker. The total length is thirteen and one-half inches. This species inhabits Southeastern Australia and Tasmania. It generally assembles in small flocks, and, although strong on the wing, is not migratory. Its favorite haunts are open districts, and it specially frequents cultivated lands, where it inflicts much damage on the crops. In addition to seeds of various kinds, this parraquet is believed to consume insects and their larvæ.



ROSE HILL BROADTAIL.
(Two-fifths natural size.)

It may be distinguished from most other parrots by its cry, which is described as a kind of chattering or warbling, with some approach to a whistle. Frequently the flocks may be observed feeding on the ground, and exhibiting little fear of man, except when they have been much fired at. In the breeding season these birds collect in large companies, making their nests in hollow trees, where from four to eight or occasionally twelve eggs are laid; the males taking no share in the work of incubation. Although a very noisy bird, the Rose Hill broadtail is well adapted to captivity, being active and lively in its habits, and during the breeding season dancing and singing in an amusing manner. It has frequently been bred in Europe.

The grass parraquets, of which the turquoisine (*Neophema pulchella*) is the most familiar example, form a small genus restricted to the south of Australia and Tasmania. They belong to a group of genera readily distinguished from the broadtails by the uniform coloration of the feathers of the back, and are specially characterized by the bill being deeper than long, without any notch in its upper mandible; by the absence of a yellow collar on the



TURQUOISINE GRASS PARRAQUET.
(Two-fifths natural size.)

neck, and the nearly uniform length of the four middle feathers of the tail. The turquoisine is about the size of a lark, its total length being eight and one-half inches, of which rather more than half is occupied by the tail. It derives its name from the turquoise blue on the front of the head and wing coverts. The general color of the upper parts is green, with the forehead, a streak over the eye, the cheeks, and wing coverts turquoise blue; the breast, abdomen, and the under tail

coverts rich yellow; the sides green, and the inner wing coverts marked by a chestnut red patch. The outer upper wing coverts, together with the under coverts, are bright blue; while the primaries and primary coverts are deep blue. In the tail the four middle feathers are green with black tips, and the remainder bluish green at the base, with the inner webs black and the tips yellow. The female is somewhat paler.

Turquoisines inhabit the southeast of Australia, not ranging far inland, and being generally found in family parties of from six to eight, although when the grass is in seed they assemble, with others of their kindred, in large flocks, to feast on their favorite food. These parrots are largely terrestrial in their habits, and although the turquoise nests in hollows of trees, other species select clefts of rocks in which to lay their eggs. The number of the latter is generally eight, and the male is said to render no assistance in incubation.

In New Zealand and some of the neighboring islands this group of parrots is represented by the genus *Cyanorhamphus*, characterized by the upper mandible of the beak being black at the tip and pearly gray at the base; the red-fronted parraquet (*C. novæ-zealandiæ*) being a well-known species.

Agreeing with the above-mentioned New Zealand parraquets in their parti-colored beaks, the crested parraquets of New Caledonia and the

Crested Parraquets Loyalty islands differ from other members of the family in the presence of a small crest of feathers on the head. In the New-Caledonian crested parraquet (*Nymphicus cornutus*), of which the general color is green, and the total length about fourteen inches, the crest consists of two black feathers tipped with red, the nape has a yellow collar connecting the ear coverts, the top of the front of the head is red, and the face black. In the smaller Uvæan species (*N. uvænsis*), confined to Uvæa and perhaps Lifu in the Loyalty group, the crest consists of six dark green feathers, curving forward at the tips; there is no yellow collar on the neck, the middle of the forehead is red, and the face dark green.

Budgerigar One of the prettiest, and at the same time the best

known, of the smaller parraquets is the Australian budgerigar (*Melopsittacus undulatus*), also known as the Australian love bird, undulated grass parraquet, or shell parraquet, which is the sole representative of its genus. It differs from all the members of the subfamily yet noticed by the long tail feathers being narrow and acuminate, and is distinguished from the allied genus *Nanodes* by the absence of a notch in the beak. It is widely distributed in Australia, and attains a total length



HEAD OF UVÆAN PARRAQUET.
(After Layard.)

of seven and one-half inches, four of which are taken up by the tail. Such a well-known species as the budgerigar (a term meaning "pretty bird") requires but little description, and this is the more fortunate, as the complex coloration renders any exact description somewhat difficult. Its general color is grass green, with the front of the head primrose yellow, the tail blue, and the remainder of the head, neck, back, and wings mottled with undulating and alternating bands of grayish black and yellow. Each cheek has an oblique patch of blue, below which



BUDGERIGARS.

are three round black spots. The male is distinguished by the cere being black, instead of brown or cream colored, as it is in the female. The budgerigar is a very common bird in the neighborhood of Adelaide, where it may be seen in large flocks, either perching on the gum trees or feeding on the ground. Its food consists mainly of seeds; and the female lays from four to nine eggs at a time, and produces two broods in the year. Its voice is a kind of warble, not devoid of melody, and in constant use. In the domestic state these little parraquets breed very freely; and, according to Mr. Greene, the great majority of those exported to England are bred on the continent. Although readily tamed, the budgerigar is always apt to bite severely; while it is an undesirable inhabitant of an aviary, on account of its propensity to attack and disable smaller birds.

The long-tailed ground
Ground Parraquets parraquet, or swamp par-
raquet (*Pezoporus for-*
mosus), and the short-tailed ground
parraquet (*Geopsittacus occidentalis*), are
two peculiar Australian species, of ter-
restrial habits, and easily distinguished
from all others by the alternate dark
and light bars with which the feathers

of the tail are marked; hence the name of "pheasant-cuckoo" which is sometimes applied to the former. The swamp parraquet may be compared in size to a thrush, its total length being twelve and one-half inches, of which the tail takes up seven and one-half inches. It is characterized by the length of the tail, which exceeds that of the wings, and also by its long and straight nails; while the legs are also of considerable relative length. Its general color is green, with a band of dark

orange on the forehead, and the feathers of the crown and nape marked with a broad median streak of black. The remainder of the body plumage is mottled with irregular bands of black and yellow; the quills are brown, greenish outwardly, and marked with a yellow spot, and the bars on the tail feathers are alternately green and yellow.

The "Old Bushman" writes that the swamp parraquet "lives on the ground (but I have seen them perch on the tea-tree scrub), runs much and quickly, is hard to rise, flies in jerks, goes away very sharp before a wind, and is very pretty shooting, rising from the grass and heather. We used to find them during the whole year, frequenting different localities at different times, and although they could scarcely be said to flock, I generally rose three or four on the same spot. Dogs will set them like quail." They generally frequent sandy tracts covered with sparse grass and other herbage, and are but rarely seen in the neighborhood of trees. The eggs are laid on the bare ground, and are brooded by both sexes in turn. The short-tailed ground parraquet of the south and southwest of Australia differs by the tail being shorter than the wings, and the short and curved claws, as well as in coloration. It is essentially a nocturnal bird, spending the day in holes in the ground, and only issuing forth at sunset to wander abroad in search of food. A specimen in the London Zoological Gardens remained quiet and drowsy during the daytime, and only became lively and inclined to feed toward evening. It never attempted to perch, always remaining on the floor of its cage. Its cry was a sharp monotonous whistle; and its food consisted of corn and young shoots of grass. The flesh of both species of ground parraquets is said to be delicate and well flavored.

THE OWL PARROT

Family *STRINGOPIDÆ*

From the practical absence in those islands of indigenous mammalian life, many of the birds of New Zealand have more or less completely lost the power of flight, owing to the disuse of their wings, and among these flightless species is a very remarkable member of the present order—the owl parrot, or kakapo (*Stringops habroptilus*), which is not only the representative of a distinct genus but likewise of a separate family. This bird is distinguished from the other members of the order by the rudimentary condition of the keel of the breastbone or sternum, and likewise by the radiating disc of feathers around the eye, which communicates the characteristic owl-like appearance to the head. The beak is thick and swollen on the sides, with no notch, and the nostrils open in a much inflated cere. The wings are short and rounded, with the fourth, fifth, and sometimes the sixth primaries the longest, and the tail is also comparatively short, with its extremity rounded, but the individual feathers pointed. The metatarsus is somewhat elongated, the nails moderately long, and the whole plumage rather soft.

The ground parrot is a somewhat large bird, attaining a total length of about twenty-four inches, nine of which are occupied by the tail. The general color of the plumage of the upper parts is sap green, each feather having a median yellow line margined with black, from which spring irregular black rays. The feathers of the front and sides of the head are, however, pale umber colored, with median lines of yellowish white, and those of the wings and tail are mainly brownish buff, vari-



THE OWL PARROT.
(One-fourth natural size.)

ously mottled with black and lemon yellow. Beneath, the prevailing tint is greenish yellow, tinged with lemon yellow, and with somewhat similar dark markings.

Although formerly distributed over the whole of New Zealand, the kakapo is now confined to the North island and the northern half of the South island; its semi-fossilized remains being found in association with those of the extinct moas. From many parts of the country it has been recently exterminated, and is rare in most

regions, and mainly restricted to mountainous regions, and it is probably doomed to extinction at no very distant date. Many accounts of the habits of this interesting bird have been given, from among which we select the following from the pen of Sir George Grey. This observer writes that during the day the kakapo "remains hid in holes under the roots of trees or rocks, or very rarely perched on the boughs of trees with a very dense thick foliage. At these times it appears stupid from its profound sleep, and if disturbed or taken from its hole, immediately runs and tries to hide itself again, delighting, if practicable, to cover itself in a heap of soft dry grass; about sunset it becomes lively, animated, and playful, issues forth from its retreat, and feeds on grass, weeds, vegetables, fruits, seeds, and roots. When eating grass, it grazes rather than feeds, nibbling the grass in the manner of a rabbit or wombat. It sometimes climbs trees, but generally remains upon the ground, and only uses its short wings for the purpose of aiding its progress when running, balancing itself when on a tree, or in making a short descent — half jump, half flight — from an upper to a lower bough. When feeding, if pleased with its food, it makes a continued grunting noise. It eats greedily, and is choice in its food, showing an evident relish for anything of which it is fond. It cries repeatedly during the night, with a noise not very unlike that of the kaka, but not so loud. The kakapo is a very clever and intelligent bird, in fact singularly so; contracts a strong affection for those who are kind to it; shows its attachment by climbing about and rubbing itself against its friend, and is eminently a social and playful bird. It builds in holes under trees and rocks, and lays two or three white eggs about the size of a pullet's in the month of February, and the young birds are found in March. The natives assert that, when the breeding season is over, the kakapo lives in societies of five or six in the same hole, and they say that it is a provident bird, and lays up in the fine season a store of fern root for use in the bad weather.

The extermination or reduction in the numbers of the owl parrot in certain districts is attributed to the ravages of dogs, cats, or rats, which have run wild in many parts of the island; and it is not improbable that in some parts, at least, pigs have likewise had a share in the work of destruction. According to Haast these birds are generally found in the open mossy glades of the beech forests, although they also frequent open hillsides, where they hide among blocks of stone. On two occasions the same observer met with a single kakapo during broad daylight, from which he is led to consider that these parrots are not so strictly nocturnal as has been supposed.



CHAPTER XI

THE OWLS AND OSPREYS.—ORDERS STRIGES AND PANDIONES

THE well-known and peculiar physiognomy characterizing most of the owls renders the group as readily distinguishable as that of the parrots. This characteristic "owl-face" is due, firstly, to the forward direction of the eyes; and, secondly, to a circular disc of radiating feathers, more or less distinctly developed round each eye, and which may be bounded by a ruff of closely-set feathers. In common with



many diurnal birds of prey, the owls have a short, stout beak, of which the upper ridge is strongly curved, and the tip deflected in a perpendicular direction; at its base is a cere, usually covered with stiff bristles concealing the nostrils. The feet are furnished with strong, curved, and sharp claws, and have the fourth toe reversible. The metatarsus, or canon bone, although longer than in the parrots, is comparatively short and wide, with the upper part of its front surface deeply excavated, and usually furnished with a bony bridge over the outer part of the hollow; at its lower end the three pulley-like trochleæ, when viewed from below, are arranged in an arch. In the tibia, or leg bone, there is no bony bridge at the lower end, as in most parrots. The short skull has no well-marked hinge at the root of the beak; the palate is of the bridged, or desmognathous type; and the lower mandible has a short and shallow symphysis, and its angle is not produced behind the surface for articulation with the quadrate bone. The oil gland is present, but naked.

THE RIGHT CANON BONE, OR METATARSUS, OF THE SNOWY OWL.* The foregoing characteristics, especially those of the toes and leg bones, serve to distinguish the owls from the parrots on the one hand, and the diurnal birds of prey on the other; but the two are very closely connected in these respects by the ospreys. In addition to the features noticed, owls, as a rule, are characterized by the large size and dense feathering of their heads, the softness and fluffiness of the whole plumage, and their big, round eyes; the feet being usually feathered down to the toes. The ears are usually of large size, and are often protected by an operculum or lid; from which we may infer that the sense of hearing in these birds is highly developed. Many owls are furnished with tufts or crests of feathers above the eyes, popularly known as horns or ears, but more properly termed ear tufts. The coloration is usually a mottled blending of various sombre tints; bright colors

*The bridge over the hollow at the upper end is imperfect.
(1904)

being, as might be expected in nocturnal birds, invariably absent. The young are born in a helpless condition, and covered with down; and the eggs are invariably white, and of a rounded form. In size, these birds are subject to great variation; the eagle owls reaching to twenty-eight inches in length, while the owlets are not larger than a thrush. Considerable diversity of view has obtained as to the affinities of the owls, some authorities considering that their nearest relationships are with the diurnal birds of prey, while others regard them as more nearly related to the Picarians. From their osteology alone they appear, however, to be related on the one hand to the parrots, while on the other they are intimately connected through the ospreys with the diurnal birds of prey; in their soft internal parts they differ, however, very considerably from the latter.

**Distribution
and
Habits** Unlike the parrots, the owls (of which there are probably about two hundred species), enjoy a cosmopolitan distribution, ranging from the Arctic regions to the most distant islands of Oceania. The great majority of them are crepuscular and nocturnal in their habits, and are more or less completely dazed if disturbed and driven from their haunts during the daytime. Others, however, are but little incommoded by daylight; while the hawk owls actually seek their prey in the full glare of the sun. As owls subsist entirely on living prey, which at night must be closely approached before it can be detected, an absolutely silent flight is essential, and this is effected by the soft and fluffy nature of their plumage. It is doubtless from this ghost-like, stealthy flight, coupled with their nocturnal habits, their large glaring eyes, and their weird hootings and screechings, that these birds have in all ages and in all countries been regarded as creatures of ill-omen. Indeed, in this respect, owls hold a position among birds precisely similar to that occupied by lemurs among mammals; with the difference that, owing to distribution, while in the one case the superstition is universally diffused, in the other it is confined to certain races inhabiting the warmer regions of the Old World. While the majority of owls are arboreal, some of the species roost in holes or clefts of rocks or in buildings. It is common to see owls in museums mounted with three toes in front of and one behind the perch on which they are seated. An anonymous observer states, however, that this is totally incorrect, and that no living owl ever places three toes in front of his perch, although he could do this for a moment if he felt so minded. The same writer also observes that "no owl seizes his prey or holds it with both feet, though both feet may be used to carry it when the prey is a large one; such quarry, for instance, as a full-grown rat. With one foot the owl grasps his prey, the other foot grasps a tuft or some other inequality of the ground. Then the bird goes to work."

Owls feed chiefly on small mammals, such as rats, mice, voles, and shrews,—more especially the two latter,—as well as on birds, reptiles, fishes, and insects. The large eagle-owls will readily attack and kill hares, rabbits, and the largest game birds, and it is undoubtedly the case that such species inflict much harm on game preserves. The smaller kinds do, however, far more good than harm to the agriculturalist, and although they were formerly shot down ruthlessly, both by the gamekeeper and the farmer, there is some reason to believe that the latter, at least, is beginning to see the error of his ways. If proof were needful of the usefulness of

these birds in keeping in check the pestilential field vole, it is afforded by the flocks of owls that collected from all sides to prey on the hosts of these rodents which recently infested portions of Scotland. In all owls the indigestible remnants of their food, such as bones, feathers, hair, scales, etc., are formed into pellets in the stomach, and disgorged; such castings affording incontestible evidence of the nature of the food of these birds. All owls are furnished with a syrinx, or organ of voice, which most of them know only too well how to use; their cries taking the form of hooting, howling, screeching, or a weird kind of laughter. It is from these cries that the names of these birds are derived in many languages, as witness the English *owl*, the German *eule*, the Latin *ulula*, and the Hindustani *ulu*.

BARN OWLS

Family *STRIGIDÆ*

Although one of the commonest and most familiar of all the group, the barn owl (*Strix flammea*) is of special interest as constituting, together with a few nearly-allied forms, a family apart from that which includes all the other representatives of the order. This family (*Strigidae*) is characterized by the breastbone, or sternum, having its lower margin entire, and also by its keel being firmly united with the furcula. Then, again, the third claw has its inner margin serrated, while the second and third toes are of equal length. An additional peculiarity is to be found in the presence of a small patch of stiff feathers between the adjacent portions of the face discs. In the cannon bone the bridge over the hollow at the upper end is absent. As a genus, the barn owls are characterized by the completeness of the discs round the eyes, which are large, and narrow rapidly as they approach the beak. The wings are long, and extend considerably beyond the tail; the beak is straight at the base, and decurved only at the tip, and the aperture of the ear is large, and furnished with a distinct lid. The head is devoid of tufts, and the rather long legs are feathered down to the origin of the toes.

The common barn owl has a wider distribution than any other member of the order, being in fact almost cosmopolitan, although comparatively rare in the extreme north, and unknown in New Zealand, parts of Oceania, Persia, Japan, and China. With this extensive distribution, it would be only natural to expect great variation in the color of the plumage; and, as a matter of fact, we find representatives of this owl from widely distant regions so unlike one another that it is at first sight difficult to believe that they belong to the same species, more especially as there are also differences in point of size. In the ordinary British form, of which the length averages fourteen inches, the face discs are white, with their margins defined by the feathers being tipped with brown; the top of the head and neck are pale buff, dotted with specks of black and white; on the back and wings a darker buff, speckled with gray and irregularly mottled with black and white, obtains; the tail feathers are pale buff above, marked with five transverse gray bands, and the whole of the under parts are white. From this normal coloration there is every

intermediate stage to one where the eye discs are rusty red, the under parts tawny, and the back darker than usual; while in other cases the discs may be gray, and the whole plumage tend more or less to this tinge. In other instances, however, gray may exist only on the discs, while both the upper and under parts are of various shades of tawny and yellowish brown. Mr. Dresser remarks that the American form is slightly larger and darker, and the Indian variety both darker and of a clearer gray above than the ordinary type.



BARN OWLS.
(One-third natural size.)

Habits In Britain the barn owl is generally distributed, and resident throughout the year, although it becomes less numerous in Scotland, and as far north as Ross and Caithness, but seldom nests. Strictly nocturnal in its habits, this owl spends the day in the recesses of buildings, or in hollow trees, generally standing with closed eyes. Like other owls, it associates in pairs; and such pairs, if undisturbed, will return year after year to the same nesting place. In

hunting the barn owl quarters its ground with the regularity of a spaniel, and its food consists chiefly of voles. Its usual cry is a kind of scream, but the young utter a snorting sound. In Europe this owl is a late breeder, usually commencing to lay from the middle to the end of April, but sometimes not till May. The number of eggs in a nest generally ranges from three to six, although seven have been taken. In California the nesting may be as early as January, and there, as in other parts of America, the nest may be made in some hole in a bank, which is enlarged to suit the requirements of its tenants. Writing of the habits of the American barn owl (which he regards as a distinct species), Captain Bendire observes that strictly speaking, this owl "makes no nest. If occupying a natural cavity of a tree, the eggs are placed on the rubbish that may have accumulated at the bottom; if in a bank, they are laid on the bare ground and among the pellets of small bones and fur ejected by the parents. Frequently quite a lot of such material is found in their burrows, the eggs lying on and among the refuse. Incubation usually commences with the first egg laid, and lasts about three weeks. The eggs are almost invariably found in different stages of development, and young may be found in the same nest with fresh eggs. Both sexes assist in incubation, and the pair may be sometimes found sitting side by side, each with a portion of the eggs under them." When the eggs are hatched at distant intervals, it is probable that the warmth of the young birds aids in their incubation during the absence of the parents. It is on record that the eggs of a barn owl have been removed and replaced by those of a hen, which have been successfully hatched.

The grass owl (*S. candida*) is an allied species, ranging from India to Japan and Formosa, and found almost exclusively in long grass, while in South Africa the common species is replaced by the Cape barn owl (*S. capensis*). Both these species differ from *S. flammea* in having the upper surface of a uniform brown color, with spots of white, and lacking the mottlings of gray and black characterizing the former.

Family BUBONIDÆ

Tengmalm's Owl

With the comparatively small species, represented on the left side of the figure on the opposite page, known as Tengmalm's owl (*Nyctala tengmalmi*), we come to the first representative of the second family of the order, distinguished from the last by the breastbone having two or more distinct notches in its lower border, and also by its keel being firmly attached to the furcula; in addition to which the third toe is not serrated, and is always longer than the second. The cannon bone, or metatarsus, has a bridge over the hollow at the upper end. Tengmalm's owl belongs to a group of three genera, characterized by having the tube of the ear large and furnished with a well-developed lid, and also by the face disc being distinct and extending as much above as below the eye.

Tengmalm's owl, together with the Acadian owl (*N. acadica*) of North America, are the representatives of a genus distinguished by the absence of tufts on the head, by the extreme shortness of the cere, and the curious circumstance that the bony

tube of the ear is quite unsymmetrical on the two sides of the skull. The toes are thickly feathered, the head is relatively large, the under mandible notched, the wings long and rounded, and the tail short. This owl measures only from eight and one-half to ten inches in length, and may be easily recognized by its thick and fluffy plumage, which stands out widely on each side of the head, and by its prettily mottled coloration. The general color of the upper parts is pale brown, mottled with white bars, and the forehead spotted with white. The tail feathers are marked with five interrupted whitish bars, and the under parts are grayish white, mottled with clove-brown. This species, which is rarely met with as a



TENGMALM'S OWL AND PYGMY OWL.
(One-third natural size.)

straggler in the British Isles, is an inhabitant of the forest regions of Northern Europe and Siberia, ranging in Russia as far north as the Urals; and also occurring as a straggler in Nipal, Southern Europe, and North Africa. Across the Atlantic it reappears in Eastern North America. In habits it is strictly nocturnal, rarely being seen abroad in the daytime; and always dazed and stupid in a strong light. It frequents the densest recesses of the forests, and nests early in hollow trees, laying its eggs, from four to six in number, on the bare wood at the bottom of the hole.

The Acadian owl, in addition to its smaller size, differs by the nearly uniform color of its upper surface, by the replacement of the spots on the forehead by stripes,

and the presence of only three white bars on the tail. In length it only measures six and one-half inches, so that it is smaller than a robin. Both species feed chiefly upon insects. Writing to Dr. Coues of the Acadian owl, a correspondent observes that, "in the hollow of an oak tree, not far from Germantown, lives an individual of the common chickari squirrel with a specimen of this owl as his sole companion. They occupy the same hole together in perfect harmony and mutual good will. It is not an accidental temporary association, for the bird and the squirrel have repeatedly been observed to enter the same hole together, as if they had always shared the apartment. But what benefit can either derive from the other?"

Wood Owls The clear, hooting cry or laughter-like scream of the common English tawny or wood owl is probably familiar to most residents in wooded districts. The genus of which this owl is the best-known representative includes comparatively-large species, distinguished from *Nyctala* by the ears and their tubes being symmetrical, while the toes may be either feathered or bare. All of the species frequent woods and groves, where hollow trees are abundant, and the whole of them are strictly nocturnal in their habits. Their flight is soft and noiseless, and their food, in addition to small birds and mammals, may include frogs and fish. They breed early, and while some of the species select woods as their nesting places, others prefer old buildings. Nearly thirty members of the genus are recognized, whose range embraces the whole world, with the exception of Madagascar, certain of the Malay islands, Australia, and Oceania.

Tawny Owl The tawny brown, or wood owl, as it is indifferently called (*Syrnium aluco*), belongs to an extensive group of the genus, characterized by the crown of the head being either barred or mottled, and the completely feathered toes. It is by no means one of the largest representatives of the genus, its total length being about fifteen inches. The color of the face disc is grayish white, margined with brown; the crown of the head, neck, back, and wings is a mixture of ashy gray mottled with shades of brown; the primary quills are barred with dull white and brown, and the tail feathers, with the exception of the middle pair, are also barred with the latter color. On the under parts the ground color is grayish white, upon which there are longitudinal streaks and mottlings of brown, without any trace of transverse bars. The tawny owl is still common in Britain, although rare in Scotland, most English woods having a pair of these birds. From Britain their range extends over Europe as far as 67° north latitude, and eastward to the Urals; while it also embraces North Africa, Syria, and Turkestan. This owl is essentially nocturnal, seldom stirring from its sylvan resting place during the daytime, and if driven forth being more completely dazed than any other British species. It is this species which is generally mobbed by a crowd of small birds, such as tits, finches, and warblers, when seen abroad by day. Oak and beech woods, where hollow trunks are numerous, are the favorite haunts of the tawny owl; although occasionally the choice falls on ruins or towers. In addition to voles, shrews, rats, and mice, its food includes an occasional young hare or rabbit, and sometimes frogs, fish, and beetles. It is an early breeder, laying its three or four eggs in March, or even earlier. These are usually deposited in a hollow tree, but sometimes in ruins or old chimneys, or even in a deserted rabbit hole, or on the

bare ground; while occasionally an old rook's nest is selected. The clear hooting cry, like the words *tu-whit, to-who*, is uttered at morning and evening; while the laughter-like cry appears to be peculiar to the breeding season. The young owls are fed by the parents for a considerable time after leaving the nest, and are reported to be more easily reared in captivity than are those of any other species.



THE TAWNY OWL.
(One-fourth natural size.)

Great Gray Owl

The great gray owl (*S. cinereum*) of Arctic America, and the closely-allied Lapp owl (*S. lapponicum*) of Northern Europe and Asia, are much larger birds than the tawny owl, and are easily recognized by the gray face disc being marked by a number of fine concentric brown lines. The great gray owl has the plumage darker, with less distinct streaks on the breast, than its European cousin; but Captain Bendire regards the two as merely varieties of a single species. The great gray owl ranges from the shores of Hudson bay to the

limits of forest in about latitude 68° , but in winter it migrates southward even beyond the Canadian border into the Northern United States. The Lapp owl, which is one of the rarest of the European species, is confined to the boreal districts, in the upper part of the forest belt, occasionally straying to North Central Europe. It is distributed over Northern Scandinavia, Finland, and North Russia. The total length of the gray owl may be as much as thirty inches. The Lapp owl nests on the summits or forked branches of broken firs; in the former case making little or



URAL OWL.
(One-fifth natural size.)

no nest, but in the latter erecting a large structure of twigs. The number of eggs in a clutch is probably from two to four. Writing of the great gray owl, Captain Bendire observes that "from the limited information we possess about the nesting habits of this species it appears that in Alaska these birds nest sometimes as early as April, and in the interior as late as June. From two to four eggs seem to be laid to a set, and these are small for the size of the bird. The body of the great gray owl is, however, much smaller than that of the great horned owl, in fact but

little larger than that of the barred owl. 'The long tail and the loose fluffy plumage of the bird make it look much larger than it really is.'

Ural Owl

The Ural owl (*S. uralense*), of which a pair are represented in our illustration, belongs to a subgroup distinguished from the preceding forms by the feathers of the head and neck having a simple median dark streak, without any lateral bars. In this species the facial disc is dusky white, and the ruff pure white with dark median streaks to the feathers; on the upper parts the general color is dull white, streaked with dark brown, each feather being brown in the middle and white on the sides; on the under parts below the head the hue is whitish, some of the feathers being tinged with yellow, and all of them with a dark median streak. The quills of the wings are brown, with whitish tips, and marked with bands of paler brown, tending to ashy on their outer webs, and the tail feathers are very similarly colored. The total length of this fine bird is twenty-seven and one-half inches. The Ural owl is distributed over Northern and Eastern Europe, and North and Central Siberia, where it is locally not uncommon, especially in Scandinavia, Russia, Southeast Germany, and Transylvania. In Mongolia, China, and Japan, it is replaced by the dusky owl (*S. fuscescens*), which is smaller in size and darker and redder in color. Its habits, according to Mr. Dresser, are still imperfectly known; but in the breeding season it frequents forests and hills, while in the winter it seeks the open country. It nests early in April, and its pairing call has been compared to the bleating of a goat. Occasionally it may be seen hunting during the daytime.

Another well-known representative of the genus is the barred owl **Barred Owl** (*S. nebulosum*) of Eastern North America, distinguished from all the preceding species by the chest having a regular series of dark cross-bands, in addition to the longitudinal streaks. The general color of the upper surface is light brown, with white cross-bands; the dark tail being marked with six light-brown bars; and the beak greenish yellow. Captain Bendire writes that the barred owl "is nocturnal in its habits, but nevertheless sees well enough, and even occasionally hunts, in the daytime, especially during cloudy weather. The flight is easy, and, though quite swift at times, is perfectly noiseless. A rapidly passing shadow distinctly cast on the snow-covered ground is often the sole cause of its presence being betrayed as it glides silently by the hunter's camp fire in the still hours of a moonlight night. Far oftener, however, it announces itself by the unearthly weird call notes peculiar to this species, which surpass in startling effect those of all other owls with which I am familiar. It is necessary to listen to such a vocal concert to fully appreciate its many beauties (?), as it is impossible to give an accurate description of the sounds produced when a pair or more of those birds try to outdo one another." The barred owl generally nests in hollow trees among damp forests, the time of laying ranging from February to April, according to the latitude. Occasionally eggs have been taken resting on a solid cake of ice. No matter how frequently the nest be despoiled, a pair of birds will return to the same site year after year; and if one clutch of eggs be taken they will soon be replaced by a second.

The mottled wood owl (*S. ocellatum*) of India, which attains a length of twenty-one inches, may be selected as an example of another section of the group with

Mottled Wood Owl

feathered toes, characterized by the under surface of the body being marked with regular crossbars without any dark longitudinal streaks. This particular species has a blackish beak, the dark bars on the breast very narrow, and the upper surface uniform brown with spots or bars of white. Mr. Hume says that this owl is most commonly met with in moderately dry country, well furnished with large groves. It usually lays two eggs in a cavity or fork of some large tree, at a height of from eight to twenty-five feet from the



SHORT-EARED OWL.
(One-third natural size.)

ground, without attempt to form a nest. Certain other species of the genus, such as *S. leptogrammicum* of Borneo and several South-American forms, while agreeing with all the preceding in having the plumage of the crown of the head either mottled or barred, differ in their more or less completely naked toes. In the second main group of the genus, comprising five species of which the Indian brown wood owl (*S. indiani*) will serve as an example, the crown of the head is, on the contrary,

always of a uniform brown; the toes being either feathered or bare. The Indian brown wood owl, which is uniform chocolate brown above, becoming darker on the head, attains a length of twenty-eight inches; it is replaced in the Himalayas by the rather smaller Nipal brown wood owl (*S. newarensis*).

Eared Owls Although several groups of owls are furnished with the tufts of feathers, commonly denominated ears, it will be convenient to restrict the title of eared owls to the members of the genus *Asio*, which includes the common long and short-eared owls of Britain. While agreeing with those of the two preceding genera in the structure of their ears and the form of the facial disc, the owls of this genus are readily distinguished by the presence of longer or shorter ear tufts, and also by the cere being of much greater length. In all of them the lower mandible is notched; the tube of the ear very large; the wings long, usually with the second quill the longest; and the legs and toes are generally more or less feathered to the claws. They are all purely nocturnal birds, seldom or never hunting by day, and not leaving their roosts till evening. They may frequent either woods or open country, and nest either in trees or on the ground. Their flight is very silent, and their cry a loud hoot. The species are few.

Short-Eared Owl The short-eared owl (*A. accipitrinus*) is a common and well-known British species, having an almost world-wide distribution, and ranging from the Arctic regions to South America and Africa, although unknown in Australia and Oceania. The distinctive characteristic of the species is the shortness of the ear tufts, which are less than the length of the third toe and claw. The general color of the upper parts is fulvous or tawny, with each feather streaked with brown down the middle; whereas in the allied Cape eared-owl (*A. capensis*) the same surface is uniform brown. In the common species the under parts are pale buff, with streaks of blackish brown; the wings and tail are barred with brown (five stripes on the latter); the facial disc dusky with a whitish border; the beak horn color; and the iris golden yellow. The whole length of the bird varies from fourteen to fifteen inches, and, when closed, the wings reach beyond the end of the tail.

Widely distributed in Great Britain, the short-eared owl breeds but sparingly, many of the specimens seen being merely winter visitants. In place of frequenting woods and groves, this owl haunts open moors, fields,—either stubble, grass, or turnips,—and generally nests on the ground rather than on trees or bushes. Although mainly nocturnal, if flushed during the day—as not unfrequently happens in partridge shooting—it flies strongly and well; and it is even said to hunt its prey at times in cloudy weather during daylight. Its cry is said to resemble the words *keaw-keaw*. In most parts of Europe the chief food of the short-eared owl consists of voles, but in Scandinavia it preys almost exclusively on lemmings. It also kills small birds and beetles. At such times as plagues of the short-tailed vole have made their appearance in the British Islands, it has been this owl which has made its appearance in the greatest numbers to prey upon the obnoxious rodents; and it also collects in similar flocks during the periodical migrations of the lemming in Norway. It is a curious circumstance that although the number of eggs laid by this bird is generally four, yet when food is unusually abundant, as during a lemming migra-

tion, the number in a clutch will rise to seven or eight; and during the recent vole plague in Scotland even larger numbers are recorded, reaching to as many as thirteen. The eggs are usually laid in a hollow of the ground, with only a very slight nest. In India Jerdon states that this owl "is almost exclusively found in long grass, and in beating for florikan many are always flushed; one now and then paying the penalty of keeping company with such a game bird by falling to the gun of some tyro. It is migratory in India, coming in at the beginning of the cold weather, and leaving about March." In North America the breeding range of this owl extends



SCOPS OWL AND LONG-EARED OWL.
(One-fourth natural size.)

from the middle of the United States to the Arctic regions. "Its home," writes Captain Bendire, "is amidst the rank grasses or weeds usually found along the borders of lakes and sloughs in the open prairie country, where it hides during bright sunshiny days. If the sky is clouded, this owl may be frequently seen hunting in the early morning or evening, and sometimes in the middle of the day, and at such times it flies very low, not more than a few feet from the ground, which it carefully scans for its humble prey. Its flight is remarkably easy, graceful, and perfectly noiseless. From the fact that these owls are generally seen in pairs at all seasons of the year, it is very probable that they remain mated through life." While in the Arctic regions the nesting of this owl is often deferred till June, in the more southern

portions of its range it takes place in March or April. In defense of their eggs or young, both sexes of the short-eared owl display but little boldness, usually circling round and round the intruder, uttering a shrill cry, accompanied by a snapping of the beak, but not making any attempt at a direct attack.

Long-Eared Owl As its name implies, the long-eared owl (*A. otus*) belongs to a group of which there are three or four representatives, characterized by the great length of the ear tufts, which are about as long as the third toe and claw. From its beautifully mottled plumage, of which the general color above is blackish brown variegated with orange buff, while beneath it is orange brown streaked and barred with black, this owl is one of the handsomest of the British species. The facial disc is dusky white, with hair-like lines of brown, while immediately round the eyes the feathers are blackish. The head is finely mottled dusky and tawny; and both the quills and tail feathers are barred with dark brown, the number of such bands on the tail being seven. The bill is dusky horn color, and the iris of the eye orange yellow. In size this owl is rather inferior to the short-eared species, its total length being thirteen and one-half inches. The typical form of the long-eared owl is distributed all over Europe as far north as the 64th parallel, while southward it ranges to North Africa in winter, and eastward it extends to China, Japan, and Northwestern India. In North America, as far south as Mexico, it is replaced by the American long-eared owl, regarded by Dr. Sharpe as a mere variety, but considered by Captain Bendire and others to represent a distinct species (*A. americanus*). It is distinguished from the European form by the darker tone of the entire plumage, and by the white feathers of the breast being striped down the middle with brown, and barred on the sides with the same tint. The European long-eared owl is a forest-dwelling bird; and while in Britain it is resident through the year, on the Continent and eastward it is more or less migratory. On the Continent it is much more numerous in winter than summer; and it is not unfrequent in the former season to see parties of from ten to sixteen, or even more, together; such parties assembling in the open fields. In England a pair of these birds always keep to one particular wood. Unlike the majority of its kindred, this owl is a silent bird, making little or no noise, except when young; on which account its presence is often unsuspected in districts where it may be comparatively common. It nearly always nests in woods, frequently selecting a deserted squirrel's drey or crow's nest in which to deposit its four or five eggs; the usual laying time being March. Although mainly nocturnal, this species is not exclusively so, Mr. Tuke observing that in Yorkshire he has met it "in the woods, sailing quietly along, as if hawking, on a bright sunny day." In their nests the same observer has detected remains of numerous small birds, as well as the foot of a young hare or rabbit. Both in Europe and America their chief food consists, however, of the various kinds of smaller rodents, although, where frogs are numerous, these also contribute to the menu. In America, Captain Bendire states that very few of the nests are built by the birds themselves, but one which had been thus constructed was formed of twigs of willows and aspens, and was remarkable for the depth of the cup, which was lined with hair. In mountainous regions it is stated that nests are occasionally made on cliffs. Writing of the American form, the observer just referred to states that "in the day-

time, particularly on a bright sunny day, the long-eared owl will allow itself to be closely approached, and on discovering the intruder will try to make itself look slender and long by pressing the feathers, which are usually somewhat puffed out, close to the body, and sitting very erect and still. It might in such a position very readily be mistaken for a part of the limb on which it may be sitting. Occasionally, while on the ground, for instance, and being suddenly disturbed at a meal, they throw themselves into quite a different attitude—one of defiance, making themselves look much larger than they really are, and presenting a fierce and formidable front. I nearly stepped on one of them once while it was busily engaged in killing a ground squirrel, which it had evidently just caught. The owl was sitting by the side of a fallen pine tree, and as I stepped over it my foot was placed within twelve inches of the bird. All at once she seemed to expand to several times her normal size; every feather raised and stood at a right angle to the body; the wings were fully spread, thrown up, and obliquely backward, their outer edges touching each other over and behind the head, which likewise looked abnormally large; and this sudden change in appearance, combined with the hissing noise she uttered, made it appear a very formidable object at first sight."

The Jamaica long-eared owl (*A. grammicus*) differs from all the other representatives of the genus in that the number of light bands on the quills is ten, there being also about the same number on the tail feathers. It is also distinguished by the toes being completely bare, although it is approached in this respect by the Stygian owl (*A. stygius*) of Brazil.

Pygmy Owls The pygmy owls, few of which exceed eight inches in length, while several are less than six, bring us to the first representatives of the second subfamily of the *Bubonidae*, which includes all the remaining members of the order. The group is characterized by the ear tube being not larger than the eye, and unprovided with an operculum, and also by the facial disc being unequal, and in some cases very imperfectly developed, the portion below the eye being always much larger than that above the same. The latter difference may be seen by comparing the figure of the Ural owl on p. 1912 with that of the little owl on p. 1923. The pygmy owls, of which the common species (*Glaucidium passerinum*) is represented on the right side of the illustration on p. 1909, in addition to their small size, may be distinguished by the absence of ear tufts, the inflated and swollen cere, in which are pierced the nostrils, by the first primary of the wing being short, the whole wing short and rounded, the tail also rounded, and more than half the length of the wing, and the metatarsus of moderate length, and densely feathered. There is not unfrequently some confusion between the members of this genus and the little owls of the genus *Carine*, but if it be remembered that while in the former the first primary is short, in the latter it is long, the difficulty will vanish. There are some twenty species of pygmy owls, ranging over the greater part of the Old World, but not found eastward of the Malay islands; and also occurring in Southern North America and the whole of South America. For their size these little owls are bold and rapacious, many of them flying at birds of larger bulk than themselves. Usually nocturnal, and hunting in the morning and evening, they may at times be seen abroad in daylight. Mice, voles, lemmings, small birds, and large insects form

their chief food; their cry is a kind of whistling note, which may be imitated by blowing into a key. They build in hollow trees, without forming a nest.

The common pygmy owl, which is unknown in Britain, is the smallest European representative of the order, and ranges over Europe and Northern Asia from Norway to Eastern Siberia. It belongs to a group of the genus in which the head is usually spotted or streaked, although occasionally nearly uniform, the second great group of the genus being distinguished by the regular barring of the top of the head. In size this species attains a length of eight and one-half inches, and its general color above is umber brown, becoming ashy on the head and back, and variegated with yellowish white spots, tending to bars on the back. The head is thickly dotted with these round spots; the sides of the face are white, barred with dark brown, and the white breast is marked with longitudinal splashes of dark brown. The toes are thickly feathered. This owl is generally distributed in Norway, where it is commonly found during the summer in forests, either evergreen or deciduous, but in winter it approaches human habitations. A certain number of individuals migrate in winter. It may frequently be seen at midday, sitting silently on some bare tree, and when made bold by hunger, it will fly at and seize sparrows and tits while on the wing. It generally nests in hollow aspen trees, and lays four eggs at a time.

Among the second group of the genus, or those in which the head is regularly barred across, we may refer to the jungle owlet (*G. radiatum*) of the plains of India, and the large-barred owlet (*G. cuculoides*), ranging from the Himalayas to Burma, and attaining a length of eleven inches. The former does not exceed eight inches in length, and has nine bars of white, including the one at the tip, whereas in the larger species there are seven of such bands. The large-barred owlet has the whole plumage brown banded with five transverse white bars, giving it a very unmistakable appearance; but in the jungle owlet there is a large white patch at the base of the neck in front. The latter species is dispersed in the forest regions all over India, and breeds in April and May, laying three or four eggs in the hollows of trees. These owlets are strong flyers, and will kill small birds on the wing in the daytime. Mr. Hume says that they can easily be tamed, and will then eat cooked meat, frogs, insects, or almost anything that may be offered them. A pair he had in captivity "were excessively noisy birds, both by night, and even at intervals by day, in fact at times a perfect nuisance. Dogs were their abomination, and in the way in which, menaced by a puppy, who evidently thought it famous fun, they would lower their heads, set out their wings and ear coverts, and 'curse and swear' (a mixture of hissing and chattering, utterly indescribable in words), was really quite edifying!" The same writer observes that in the Eastern Himalayas the large-barred owlet may frequently be seen sitting on trees or stumps in the full glare of the midday sun. Its presence may be easily recognized by its chuckling, vibrating call. It generally nests in hollow oaks, at a height of twenty or thirty feet from the ground, laying four eggs in a clutch.

As the name hawk owl is commonly applied both to the members of the present genus, and also to the true hawk owl (*Surnia*), it is necessary to distinguish the former by the affix Oriental. These owls agree with those of the preceding genus

Oriental
Hawk
Owls

in the shortness of the first primary quill of the wing, the interval between its tip and that of the third primary being in all the group either equal to or greater than the length of the metatarsus. Whereas, however, in the pygmy owls the wing was short and rounded, in the present genus it is long and pointed, the interval between its points and the end of the tail being not more than equal to the length of the metatarsus. From their nearest allies, the Oriental hawk owls are distinguished by the short metatarsus, of which only a very small portion is bare. Most of them have relatively small



BURROWING OWL.
(Two-fifths natural size.)

heads, in which the face disc may be very imperfectly developed, and short bills, while the tail is long and firm, and the plumage of the wings likewise hard. The genus comprises a large number of species, ranging from India through China, Japan, and the Malayan region to Australia and New Zealand, and likewise represented in Madagascar. The species vary greatly in size, the great Australian hawk owl (*Ninox strenua*) attaining a length of twenty-four inches. Writing of the Indian species, Jerdon remarks, that in the small size of its head, the slight development of the disc, the firm plumage, and the length of the tail, these owls approach the diurnal birds of prey.

The Indian brown hawk owl (*N. lugubris*), which measures twelve inches in length, and is of a uniform glossy brown above, with a grayish tinge on the head, is common in the wooded parts of India. Although generally nocturnal, it occasionally issues forth before dark; its food is stated to be mainly insects, although it will also eat small mammals and reptiles.

Burrowing Owl The curious little burrowing owl (*Speotito cunicularia*) of America has a special interest on account of its habits, and accordingly demands a somewhat fuller notice. This bird is only some nine inches in length, and may be easily recognized by the length of its legs, of which a considerable portion is bare, and its spotted plumage. It differs from the preceding form by the length of the first primary quill, the interval between its tip and that of the third feather of the same series being less than that of the metatarsus. The whole wing is comparatively short, and has but little power of sustained flight. The general color of the plumage is sandy brown, the head being marked with oval splashes of buffish white, while all the back, wings, and tail are mottled and barred with white or buff. The throat and the front of the neck are white, but most of the remainder of the under surface creamy white, with transverse bars of sandy brown, gradually becoming more and more indistinct toward the under tail coverts, where they disappear. Although it has been considered that there are several distinct species of burrowing owls, Dr. Sharpe is of opinion that only two can be distinguished, one of which ranges throughout the southern and western portions of the United States and the whole of Central and South America; while the second (*S. guadelopensis*) is confined to the West Indies. There are two great peculiarities in the habits of the burrowing owl; firstly, that it is largely diurnal, and secondly, that it always takes up its residence in underground burrows. Regarding its diurnal habits in South America, Mr. W. H. Hudson writes that, "all day long, in cold and in heat, it stands exposed at the mouth of its kennel, or on the viscacha's mound, staring at the passer-by with an expression of grave surprise and reprehension in its round yellow eyes; male and female invariably together, standing stiff and erect, almost touching — of all birds that pair for life the most Darby-and-Joan-like." In North America, where these owls are mainly confined to the prairie regions, Captain Bendire writes that they "may be seen sitting in front of their burrows at any hour of the day. When not unduly molested, they are not at all shy, and usually allow one to approach them near enough to note their curious antics. Their long slender legs give them rather a comical look, a sort of top-heavy appearance, and they are proverbially polite, being sure to bow to you as you pass by. Should you circle around them they will keep you constantly in view, and if this is kept up, it sometimes seems as if they were in danger of twisting their heads off in attempting to keep you in sight. If you venture too close, they will rise and fly a short distance, and generally settle down near the mouth of another burrow close by, uttering at the same time a chattering sort of note, and repeat the bowing performance. Occasionally, when disturbed, they alight on a small sage bush, probably to get a better view of the surroundings."

In many parts of North America, the burrowing owl takes up its quarters in the warrens of the prairie marmot (*Cynomys*), one pair of birds to a burrow; and it

was at one time thought that both owls and marmots, together with the rattlesnakes which likewise frequent the colonies, lived together as a kind of happy family. Modern research, has, however, shown that this is one of many zoological fables. Captain Bendire is indeed of opinion that, in spite of its diminutive stature, the owl is a match both for the marmot and the snake, and that it subsists to some extent on the young marmots, if not also on the old ones. In parts where there are no marmots, such as California and Oregon, the owls generally frequent the burrows of the susliks (*Spermophilus*) which they enlarge to suit their own requirements, and Dr. Coues states, they sometimes occupy the earths of wolves, foxes, or badgers. From having been found living alone, the latter writer thinks that the owls may sometimes excavate their own burrows, but this is considered improbable by Captain Bendire. On the pampas of Argentina, the burrowing owls take up their residence with the viscacha (*Lagostomus*). Mr. Hudson says that the "birds generally make their own burrows to breed in, or sometimes take possession of one of the lesser outside burrows of the village, but their favorite residence, when not engaged in tending their eggs or young, is on the viscacheria." During the daytime they are exceedingly bold, flying and screaming round the head of the intruder on their domains (as the writer has often witnessed), while at night their weird cry resounds across the silent pampas. In North America the food of these owls consists of young prairie marmots, susliks, chipmunks, gophers, and other small mammals, as well as lizards, frogs, fish, large insects, and perhaps small birds. The owls hunt their prey mainly in the early evening and during the night, and but rarely in the daytime; they are exceedingly voracious, each bird being said to eat fully its own weight in the twenty-four hours, if it can obtain a sufficient supply. In North America the breeding season commences in the latter part of March, the same burrow being generally used year after year, and cleaned out and repaired when necessary. The burrows, according to Captain Bendire, vary from five to ten feet in depth, and are usually about five inches in diameter, the nesting chamber being, however, from twelve to fifteen inches across. Frequently the burrow is much curved, so that the nest may lie within a couple of feet off the surface; at times the nest is lined with grass or feathers, but more generally with cow dung. Seven to nine is the usual number of eggs, but there may be as few as six or as many as eleven. Both sexes assist in incubation; and, unless the eggs be taken, but a single clutch is laid in a season. In defense of their eggs and young, these little owls exhibit determined ferocity, retreating to the ends of their burrows, and striking out at the intruder with beak and claws.

Although the name little owl, or owlet, is of course equivalent to pygmy owl, yet it is convenient to restrict the latter term to the members of the genus *Glaucidium*, and the former to those of the present genus. As already mentioned, the little owls are frequently confounded with the pygmy owls, but the two differ essentially in that the former have a long and the latter a short first primary quill. The little owls differ from the burrowing owl in that both the fourth and fifth primaries have their outer webs deeply scalloped, and also in having the upper part of the metatarsus hidden by feathers, and the base of the toes enveloped in the plumage of the metatarsus, their legs thus appearing very

short. In having the nostrils pierced near the front of the cere, they are distinguished from an allied Indian owl known as *Heteroglaux*, in which the nostrils occupy the middle of the cere. The wings are large, with the third and fourth quills of nearly equal length, and the head is large and round. The five species of this genus range from Europe and North Africa across Central Asia to China, and also from the Mediterranean countries across Persia to India and Burma. The common little owl (*Carine noctua*) is about the same size as Tengmalm's owl—from which it may be at once distinguished by its compact plumage,—and is an occasional straggler to the British Isles. The general color of the upper parts is brown



LITTLE OWL.
(Two-fifths natural size.)

mottled with oval white spots; the facial disc being grayish white, passing into brown externally, while the greater portion of the under surface is whitish streaked with brown, each feather on this aspect having a dark median line and light edges. This form is found all over continental Europe except the extreme north, but its extreme eastern limits are not as yet fully known. A desert-hunting variety or species (*C. glaux*) differs by its paler coloration, the ground color of the upper parts being rufous fawn, while the under surface is pure white streaked with rufous. Moreover, while in one form the toes are but scantily covered with hair-like feathers, in another they are thickly plumed. The pale desert form of the little owl inhabits the countries to the south of the Mediterranean, except near Tangiers (where the ordinary form occurs); and it also ranges into Northeastern Africa, and extends

eastward into Persia, India, and Afghanistan. The ordinary form is the commonest owl in Italy, and is also common in Sicily, although there it is migratory. It breeds in Italy, Gibraltar, Spain, Greece, and Holland. Professor Newton observes that "the little owl is not strictly nocturnal in its habits, for one observer has seen it, at midday, when the sun was shining brightly, carry off a sparrow from a flock, but, as a rule, toward the evening it becomes more active and vigilant. It seldom haunts forests, but frequents old buildings, towers, and church walls, where, as well as in hollow trees, and even in a rabbit hole, its nest is found." The number of eggs varies from three to five, and both sexes take their share in incubation. No nest is formed. In Italy the flesh of this owlet is commonly eaten; and this species has a peculiar interest as being the owl associated with the goddess Pallas in classical literature. In Persia, Mr. Blanford states that he has often seen five or six individuals of the pale-colored desert variety in company, and almost every garden in that country has a pair, whose melancholy cries are regularly heard at night.

In India the genus is represented by the spotted owlet (*C. brama*), in which the under parts are barred instead of streaked, and the general color above grayish brown, with large and distinct white spots, and five bars on the tail. To the eastward of the Bay of Bengal there is a variety of this species, in which the ground color of the upper parts is slaty brown, and the white spots very small, while the tail has six bars. Jerdon says that the spotted owlet is to be found everywhere in India except in dense forests. "Every clump of trees, and often a large single tree, especially near a village, is sure to be tenanted by a pair, or a small colony of these noisy birds. It often takes up its abode and roosts during the day in the eaves of houses, or under the roof, and if anything disturbs its rest, comes forth with its noisy, chattering, and disagreeable chorus. About sunset it is always on the alert, and soon after it sallies forth to feed. It takes short flights, frequently seating itself on the ground, or a paling, or low branch, or outhouse, and thence captures beetles and other insects on the wing, or snatches one off the branch of a tree, now and then taking a low, undulating flight over the plain or garden, and dropping on any small mouse, shrew, lizard, or insect it may spy on the ground." The writer has often put his hand into some hole in a tree and had his fingers seized by one of these owlets, and has frequently noticed the calm nonchalance with which the birds have sat and regarded him when they have been dragged forth. The spotted owlet lays from two to four eggs, which are generally deposited in March.

Hawk Owls

As already mentioned, the term hawk owl, although commonly applied to the members of the genus *Ninox*, properly belongs to the species here represented. It may be well to add that the reader must be careful to avoid confusing the scientific title of this genus with the name *Syrnium* (p. 1910). The hawk owl brings us to a group of genera differing from those already described by the cere not being inflated, with the oval nostrils always pierced in its front margin. The hawk owls, which have no distinct ear tufts, are characterized by the long and graduated tail, which approaches the wing in length. The head is unusually flat, with the facial disc nearly obsolete, a strongly-curved and powerful bill, and a small orifice to the ear. The wings are short, and the whole plumage very hard and compact, while the legs are rather short, and the toes thickly feathered.

The hawk owl (*Surnia ulula*) is the most hawk-like member of the order, both in appearance and habits. The typical form is distributed over Northern Europe and Asia, ranging through Siberia to Kamchatka and Amurland, a few stragglers ranging into Central Europe in the winter. It is represented in North America, to the northward of latitude 40°, by a darker variety (*funerea*); and, according to Dr. Coues, it is to this variety that some of the specimens taken in Britain belong. In



THE HAWK OWL.
(One-third natural size.)

length this owl reaches fifteen or sixteen inches. The general color of the upper parts is brown mottled with white,—the white being most abundant on the head and neck, and least so on the umber wings. The facial disc is dirty gray, bounded on the sides by a crescentic purplish brown patch, extending down from the ears. The chin is dusky; the throat and upper part of the breast are dull white, while the remainder of the under parts is dull with numerous dusky bars, the under surface of the tail being barred with grayish brown and dull white. In addition to the

darker color of the upper surface, the American variety is distinguished by the broader and redder bars on the breast, and the smaller size of the white gorget. In habits the hawk owl is strictly diurnal, hawking its prey in the bright sunshine. It is an inhabitant of the subalpine districts of Norway, sometimes reaching as high as the zone of birch trees, although its true home is the fir woods. Frequently it may be seen sitting in the full sunlight on some bare tree, surrounded by a mob of small birds; these the owl generally disregards, although at times it makes a sudden swoop on one of its tormentors. At the times when lemmings are migrating, hawk owls make their appearance in great numbers to prey upon the rodent hosts. The nesting place is usually upon the broken top of some dead tree, the eggs (five to eight in number) being laid either on the bare rotten wood, or upon a thin layer of dried grass. The female commences to sit from the laying of the first egg. Never shy, in the breeding season this owl is bold in the extreme. When the nest is approached, the bird rapidly raises its head and tail in a series of jerks, after the manner of a cuckoo, and then suddenly dashes at the intruder. Writing of the habits of this species in Lapland, Mr. Wolley, in a letter to Professor Newton, observes that the "hawk owl flies much in the daytime; and, with its long tail, short, sharp wings, and quick flight, has a very hawk-like appearance in the air, when its large square head is not seen. It carries itself much after the fashion of the more regular owls, but while all the feathers at the back give a great breadth to its full face, there is quite a table at the top of its head. It casts its bright yellow eyes downward with the true air of half-puzzled wisdom, or turns its head round for a leisurely gaze in another direction; to glance backward is out of the question, and to look at anyone with a single eye is much beneath its dignity."

The chief food of this owl consists of lemmings, voles, mice, and birds. The breeding season apparently commences in the middle of April and continues till the end of June; and, as the eggs are laid at intervals, some may frequently be found far on in the latter month. In America the hawk owl probably breeds only in the fur country and the wooded districts of Alaska. It is there very destructive to ptarmigan, as it is in the Old World to willow grouse. In America the number of eggs laid varies from three to seven. Mr. R. MacFarlane states that on the Anderson river "four nests of this species were discovered, and the eggs taken therefrom. All of them were built in pine trees at a considerable height from the ground. One was actually placed on the topmost boughs, and, like the others, constructed of small twigs and sticks, and lined with hay and moss."

Snowy Owl Conspicuous for its snowy plumes — generally more or less mottled with black — the great snowy owl (*Nyctea scandiaca*) cannot be confounded with any other member of the order, being the only representative of its genus. As a genus the snowy owl is distinguished from the preceding by the shortness of the tail, which is only about the length of the wing, and also by the under tail coverts being produced nearly to the tip of the tail. Moreover, there are slight rudiments of ear tufts. The plumage of the adult bird may vary from pure white to white largely spotted with black; when present, the dark markings are placed near the tips of the feathers, and while those on the under parts are crescentic, those above approach a linear form. Although the

nestling is covered with sooty-black down, the first feathers are similar to those of the adult; whence we must conclude that the evolution of the white plumage dates from an extremely remote period. While Professor Newton is disposed to regard the amount of black in the plumage as an individual peculiarity, Dr. Sharpe believes that the pure white plumage occurs only in the oldest birds, and then only in the male sex. In length the snowy owl measures upward of twenty-six inches.



SNOWY OWL AND LAPP OWL.
(One-fifth natural size.)

The snowy owl has a circumpolar distribution, inhabiting the northern regions of both Hemispheres, and straggling southward in winter. Common in Lewis, and blown over to the east coasts of Scotland in considerable numbers, and likewise visiting Ireland in winter, the snowy owl does not breed in any portion of the British Islands. Found in Iceland during the winter, it is a permanent resident in Scandinavia, Greenland, and Northern Russia; while in winter it ranges all through

Siberia to Amurland, and has been taken in Poland and Lithuania, as also at Peshawur. Although rare in Spitzbergen, it is common in Nova Zembla and on the northern coast of Asia. At the present day this owl is very rarely seen in the south of England, but during the Pleistocene period it appears to have been not uncommon, the bone represented on page 1904, having been obtained from a cave in Devonshire. And it is noteworthy that during the period in question, lemmings, which now form such a large portion of the prey of this species, were also common in England. In America this owl ranges as far south as Texas. The open and desolate moss-covered tundras of Northern Siberia and Lapland, as well as the corresponding regions of North America, are the favorite haunts of the snowy owl. A shy bird, hunting both by day and night, and endowed with noiseless though powerful flight, it falls suddenly on its prey, which is always immediately devoured on the spot. In the Old World its food consists of lemmings, young sea birds, ptarmigan, grouse, ducks, and, it is said, the Arctic fox and hare; while in the Trans-Baikal districts susliks are largely consumed. Whenever lemmings are on the move, numbers of snowy owls are sure to collect. In America these birds will often take the musquash from the trap, and in both Hemispheres they have been known to fish. The nest is usually placed on the bare ground, in a spot raised somewhat above the general level of the plain, but it may be situated on a ledge of rock. It is a poor affair in the way of structure, the eggs resting merely on a few feathers. The usual number of eggs is from four to seven, but in seasons when lemmings are numerous as many as ten may be laid at considerable intervals of time. Incubation commences with the first egg, so that eggs and young are frequently found in the nest together. While the female is sitting, the cock bird remains on the watch near by, and gives the alarm in case of danger. According to Mr. Turner's observations, the old birds, and more especially the female, exhibit great boldness in defense of their nests, flying close to the head of an intruder with outstretched talons and snapping beaks. In such cases the natives are reported to seize hold of one of the young, whereupon one of the parents charges the despoiler, who holds up his gun stock, against which the bird dashes headlong.

Screech Owls With the screech owls, or scops owls, we come to a genus of mostly small species; distinguished from the preceding representatives of the group with uninflated ceres by the presence of distinct ear tufts. In this characteristic these owls agree with the large eagle owls to be next mentioned, from which they are distinguished, in addition to their generally smaller size, by the wings being very long and reaching nearly or quite to the tip of the tail. As a rule the toes are feathered, but in certain species the metatarsus is completely bare. There are between twenty and thirty species of these small-horned owls, which range over the greater part of both the Old and New Worlds, although only one of them occurs in Europe. In habits they are largely nocturnal, although they may at times be seen abroad in the daytime. Groves, gardens, and wooded districts are their favorite resorts; their nests are made in trees, and the food of some of them is to a great extent composed of the larger insects. Dr. Sharpe remarks that the various species of screech owls are more difficult to distinguish than are those of any other genus, although the Old-World forms are very distinct from those of America.

The common scops owl (*Scops giu*), which is represented on the left side of the figure on p. 1916, is one of the smallest European members of the family, and is occasionally met with in England. It ranges over southern continental Europe in summer, and in winter reaches North Africa; while eastward it extends to Persia and Turkestan, being replaced by allied varieties or species in Japan, India, Malaysia, and South Africa. In length this little owl does not exceed eight inches, and it belongs to a group characterized by the dusky hue of the beak, the grayish-brown color of the face disc, the slender and feathered metatarsus, and the general gray or brown hue of the plumage, of which the upper surface is vermiculated, while on both wings the middle lines of the feathers are distinctly streaked with black. Although generally nocturnal, the scops owl has been observed in Spain in the full summer sun. Its flight is very like that of the little owl, and its food consists almost wholly of insects. In May the female lays from five to six eggs in the hollow of some tree, and the bird sits so close that it may often be taken by the hand. "This owl," as Professor Newton observes, "is remarkable for the constancy and regularity with which it utters its plaintive and monotonous cry, sounding like *kew*, *kew*, and pronounced at intervals of about two seconds throughout the livelong night."

Among the American species we may mention the flammulated screech owl (*S. flammeolus*), ranging from the Southern United States to Guatemala, which is of small size, with the metatarsus feathered for more than half its length, and the toes bare; the common North-American screech owl (*S. asio*), which has a very extensive range and numerous varieties, and is distinguished by its feathered toes, and, lastly, the crested screech owl (*S. cristatus*), of Amazonia, which attains a length of fully sixteen inches. The common screech owl is an abundant bird exhibiting a gray and a red phase of plumage, and is not migratory. Although living for the greater part of the year in forests, when the ground is mantled in snow this owl seeks the protection afforded by buildings, and is then more frequently seen. It is considered a true friend to the farmer, as it lives almost exclusively on mice and other small rodents and the larger insects. Hollow apple and oak trees are its favorite nesting resorts; the eggs, usually five or six in number, being laid on the bare wood.

Eagle Owls The great horned owls, or eagle owls, include the largest and most powerful representatives of the entire order, but few of the species falling short of twenty inches in length. Allied to the screech owls, they may be distinguished by their relatively-shorter wings, which never reach within a considerable distance of the end of the tail; while the great size of the ear tufts and the beautifully barred plumage aids in recognizing these magnificent birds. Although the toes may be sometimes bare or but sparsely feathered, the metatarsus is always plumed throughout. The beak is short and strong, with a compressed tip, and the large nostrils are either oval or rounded. Of eagle owls there are nearly a score of species, ranging over the greater part of the Old and New Worlds, although unrepresented in Australasia. As being the only species found in Western Europe, the best known of all is the great eagle owl (*Bubo ignavus*), of which specimens are occasionally taken in Britain. This splendid bird, of which the total length may reach twenty-eight inches, belongs to a group of two or three species characterized

by the toes being so thickly feathered that even their last joints are concealed. It has a black beak and bright orange iris, while the plumage is a beautiful blending of various shades of brown. The ear tufts include a few dark feathers, with light bars on the inner webs; the hind-neck and back are mottled dark and reddish brown, with the dark tint occupying the middle of the feathers, and the same colors, but arranged in transverse bars, occupy the primary quills and tail feathers. On the

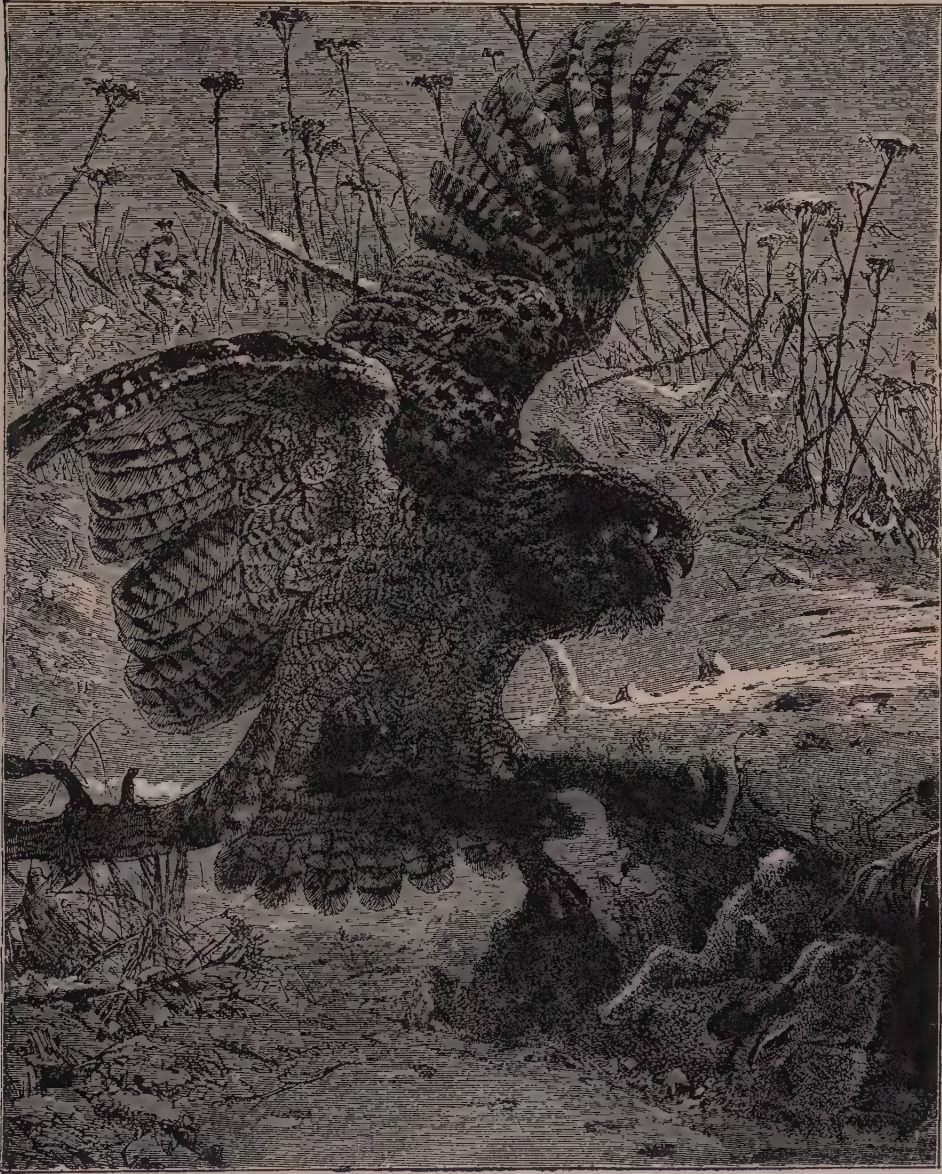


EAGLE OWL.
(One-fourth natural size.)

face disc the feathers are light brown with grayish-black speckles, while the breast is pale brown, with longitudinal streaks of darker brown, and the remainder of the under parts are shades of brown banded with darker bars.

The great eagle owl inhabits the greater part of Europe and Northern Asia, the Central-Asian form (*B. turcomanus*) being paler than ordinary. In Asia it extends as far south as the Pangong lake and the Himalayas, and it has also been obtained

from Northeastern Africa. Common in Scandinavia and South Germany, this owl is rare in Denmark, and although not unfrequent in Italy, is unknown in Sardinia. Many of the specimens taken in England have been birds escaped from captivity.



EAGLE OWL, SEIZING ITS PREY.

The eagle owl is one of the boldest and most rapacious of the European birds of prey, attacking and devouring young fawns, hares, rabbits, other small rodents, capercaillie, grouse, pheasants, and many smaller birds, as well as reptiles and frogs.

Mainly nocturnal, it appears early in the evening, and can fly well and strongly in the daylight. Its cry has been compared to the syllables, *boo, boo*. When reposing during the day, the eagle owl usually sits with its feathers ruffled up, and thus appears much larger than it really is. When irritated it spreads and drops its wings in the manner represented in our illustration, at the same time, snapping its beak and hissing, and thus rushes, with flaming eyes at its aggressor in the most menacing



INDIAN FISH OWL.
(One-fifth natural size.)

manner. Although it is said that when attacked by the golden eagle it will come off victorious, this owl appears to be quarrelsome rather than really courageous, and in the daytime will take wing immediately on the approach of an intruder. When detected on its perch, it is immediately mobbed by a host of smaller birds, generally led by a crow. The breeding season commences in the latter half of March or the beginning of April, and the two or three eggs are usually laid on a

ledge or shelf of rock with but little if any attempt at a nest. Occasionally, however, a large nest of twigs is formed, which, in the absence of suitable rocks, may be placed in a tree, while sometimes the eggs are deposited in a hole in the ground. The young are hatched in about three weeks, and are able to fly in eight weeks after birth, although they frequently remain in the nest for some time longer. This owl breeds freely in captivity.

Other Species The Virginian eagle owl is a somewhat smaller bird, distinguished by the head and neck being of the same hue as the blackish back instead of yellowish and lighter. It ranges over the whole of North, and extends into Central America, and is liable to great local variation in color. In cultivated districts this owl inflicts much damage on poultry yards, killing all kinds of birds, from turkeys down to young chickens, and frequently merely devouring the hearts of its numerous victims. Where the primitive forests have been destroyed, the owls breed in the deserted nests of eagles, hawks, or crows, but elsewhere nest in hollow trees. Usually there are but two or three eggs, although occasionally four or five; and so early in the year are these laid that in Nova Scotia and Newfoundland they are not unfrequently found frozen in the nest. The Indian eagle owl, or rock-horned owl (*B. bengalensis*), may be taken as an example of the second group of the genus, in which the covering of the feathers on the toes is more or less scanty, the last joint and sometimes the whole toe being bare. This species attains a length of twenty inches, and is confined to India. Its habits appear to be very similar to those of the other species, the nesting season being from February to April, and the eggs usually laid on a shelf of rock near water, although occasionally in a hole in the ground. That the eagle owls are an old group is proved by the occurrence of remains of extinct species in the Lower Miocene Tertiary of France; those of the existing European species occurring in the Pleistocene deposits of Norfolk. The metatarsus may be distinguished from that of the snowy owl by its longer and more slender form.

Fish Owls The fish owls of the Oriental region and Africa form a group distinguished from all other members of the order by the under surface of the toes being covered with a number of small spicules, thus presenting an admirable holding surface. In most cases the metatarsus is naked. These owls are divided into two genera, one of which (*Cetupa*) is confined to Palestine, India, Malayana, and China, and is characterized by the possession of large ear tufts; while the second (*Scotopelia*) is African, and lacks those appendages. Of the Oriental genus one of the best-known species is the Indian fish owl (*C. ceylonensis*), which inhabits Palestine, India, Ceylon, the countries on the east of the Bay of Bengal and part of China. Is is a large bird, measuring twenty-five inches in length, and is of a general tawny color above, with the individual feathers broadly streaked with black down the middle. The quills are brown with pale bands; the tail is also brown with pale fulvous bars; while the greater part of the under surface is golden tawny, with black streaks down the middle of the breast feathers. The feet are dark, and, as in all the other members of the genus, the eyes bright yellow.

This fish owl inhabits wooded districts near water, and is mainly nocturnal, although Professor V. Ball writes that he has seen one flying in the daytime.

Jerdon says that "it roosts during the day in the densest part of the jungle, coming forth to feed shortly after sunset, and generally making its way to the nearest water, be it a tank, brook, or river. Here it may be seen sitting on some overhanging rock or bare tree, occasionally uttering its loud dismal cry, which Tickell well likens to *haw, haw, haw, ho*, calling it a repulsive laugh. It feeds much on fish, and more particularly on crabs." Mr. Hume states, however, that he invariably found the remains of birds or small mammals round their breeding places. And he subsequently observes that these owls breed from December to March, but appear as a rule to lay in February. "They always nest in the vicinity of water, sometimes choosing a cleft in rocks overhanging a mountain stream, sometimes a broad shelf in the clay cliffs of some river, sometimes a huge cavity in some old banyan tree, and at times appropriating an old nest of *Haliaëtus*. Where they make their own nest, on a ledge or recess of a cliff, it consists of little but a few sticks, mingled with a few feathers, or when in holes of trees, of a few feathers and dead leaves, but when they annex an old nest of the fishing eagle's, they seem to line it more carefully with finer twigs, grass, and feathers." The usual number of eggs is two. Mr. G. Marshall writes that in the Saharanpur district he found a nest situated in the fork of a banyan tree, about twenty-five feet from the ground, the hollow being so deep that the parent bird when sitting could not be seen from the ground. To this nest the birds returned for three consecutive years.

**African
Fish Owls**

Of the tree species of African fish owls, two are restricted to the west side of the continent, from the Gabon to Senegambia, while the third (*S. peli*) is common to those districts and the neighborhood of the Zambezi mouth. Pel's fish owl is the largest, measuring twenty-three inches in length. In habits these owls appear to be very similar to their Oriental cousins, frequenting the borders of lakes and rivers, but they are all comparatively rare. A captive specimen fed eagerly on fish, which is probably the food of these birds in the wild state. The general hue of the plumage in Pel's fish owl is deep rufous bay above, marked with transverse black bars, while beneath it is pale bay, with heart-shaped black markings. The iris of the eye is dark brown, instead of the yellow tint characterizing the Oriental fish owls. We have not met with any account of the nesting habits of this species, while nothing is known of the two others in the living state.

THE OSPREYS

Order PANDIONES

The osprey (*Pandion haliaëtus*), together with two species of the Oriental genus *Polioaëtus*, constitute not only a family (*Pandionidae*), but, according to Dr. Sharpe, a separate order, which appears to connect the owls with the diurnal birds of prey. While resembling the latter in the lateral position of the eyes, which are not furnished with a distinct disc, and their firm, hard plumage, they agree with the owls in the fourth toe being reversible, as well as in the form of the canon



OSPREY AND YOUNG.

(1935)

bone or metatarsus, which has the bony bridge over the hollow at the upper end, and likewise in the general form of the lower end of the tibia,* although the latter retains the bony bridge which has been lost in the owls. Moreover, the osprey agrees with the owls, and thereby differs from the typical diurnal birds of prey, by the absence of a distinct aftershaft to the feathers. In the present group the nostrils are not concealed by bristles, and the toes are naked, and furnished beneath with spicules like those of the fish owls. The osprey, or fishing hawk, is the sole representative of its genus, and is characterized by the length of its wings, and naked and rather short metatarsus, which is entirely covered with reticulate scales. In length the osprey varies from twenty-two to twenty-four inches. In color, the beak is black, the cere blue, and the iris yellow. The elongated feathers at the tip of the head and nape of the neck are whitish, streaked with brown; the upper surface of the body and wings is dark brown, with the ends of the primaries black, and that of the tail two shades of brown. Beneath, the chin and throat are white, the upper part of the latter being marked with a pale brown band, while the abdomen, thighs, and under tail coverts are also white. The wing is partly white and partly brown beneath, and the lower surface of the tail is white, barred with grayish brown. The legs and toes are blue.

Following the views of most English writers, that there is but a single representative of the genus, the osprey has an almost cosmopolitan distribution, although it is unknown in the extreme south of South America, as well as in parts of Oceania. In England it is a rare summer visitor, but it used formerly to breed in many parts of Scotland, where it is now well-nigh exterminated. For nearly a century a pair have, however, bred at Loch-an-Eilan Castle. In 1890 three birds appeared at the nesting place, one of which, after a fierce encounter, was killed, whereupon the others disappeared. In 1891 a pair again visited the district, but instead of taking up their old quarters, selected Loch Merlich — some miles distant — as their abiding place. Here they were unfortunately disturbed, but in 1892 they once more reappeared at Loch-an-Eilan, where effective measures have been taken to secure them from molestation. The osprey feeds almost exclusively on fish, which it captures both at sea and in fresh waters, and it is doubtless for the purpose of holding its slippery prey that the fourth toe is reversible, and the soles of the feet covered with spicules. Sir J. Richardson writes that "when looking out for its prey, it sails with great ease and elegance, in undulating and curved lines, at a considerable altitude above the water, from whence it precipitates itself upon its quarry, and bears it off in its claws; or it not unfrequently, on the fish moving to too great a depth, stops suddenly in its descent, and hovers for a few seconds in the air, like a kite or kestrel, suspending itself in the same spot by a quick flapping of its wings; it then makes a second, and, in general, unerring dart upon its prey, or regains the former altitude by an elegant spiral flight. It seizes the fish with its claws, sometimes scarcely appearing to dip its feet in the water, and at other times plunging entirely under the surface, with force sufficient to throw up a considerable spray. It emerges again, however, so speedily as to render it evident that it does not attack fish swimming at any great depth."

*I have not had the opportunity of examining the leg bones of *Polioaëtus*.

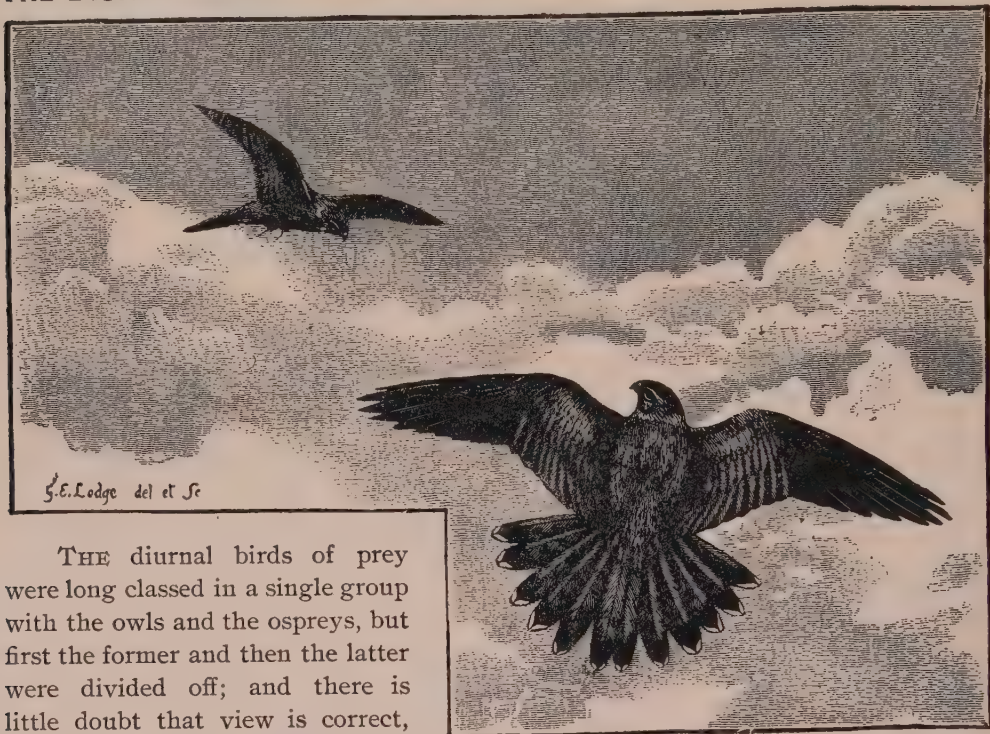
On the Continent the osprey generally builds in the latter part of April, laying three, or rarely four eggs, which resemble those of the Accipitrine birds in being blotched with shades of reddish brown. The nest is large, and composed of sticks, and may be placed either on a tree, a ledge of rock, or in a ruined building. In North America, where ospreys are numerous, Captain Bendire states that the nest is usually built in a tall tree—frequently on the top of the broken stem of a pine. In places where trees are scarce, as in some parts of California, the nest may be situated either on the ground or on a cliff. Mr. W. W. Worthington writes that on Plum island many pairs of ospreys “nest on the ground, on the tops of sand dunes, in such cases depositing the eggs on the sand; the nest consisting of a few sticks, bunches of seaweed, and pieces of various kind of rubbish arranged in a circle. In other cases the nests are built up several feet, the height in all probability being regulated by the number of years the nest has been occupied, and the amount added to it from year to year.” But a single brood is produced during the year, and, while the period of incubation is commonly considered to be twenty-one days, Captain Bendire believes it to be a week longer.

**Oriental Fish
Eagles**

The Oriental fish eagles, which must not be confounded with the sea eagles, constitute a genus (*Polioaëtus*) differing from the preceding by the shorter wings, longer tail, and differently-formed feet, and confined to India and the Malayan region. The large Oriental fish eagle (*P. ichthyaëtus*) somewhat exceeds the osprey in size, whereas the smaller (*P. humilis*) is inferior in this respect. The larger species has the upper plumage brown, becoming paler on the middle of the back, and darker on the wings, while the head and neck are ashy gray and the tail white, with a broad bar of brown at the tip. Its range extends from India to Celebes, and its food consists mostly of fish.

CHAPTER XII

THE DIURNAL BIRDS OF PREY, OR ACCIPITRINES—ORDER ACCIPITRES



MERLINS.

THE diurnal birds of prey were long classed in a single group with the owls and the ospreys, but first the former and then the latter were divided off; and there is little doubt that view is correct, although, to our thinking, the ospreys appear to connect the two

groups very intimately. Exclusive of the ospreys, the diurnal birds of prey, as they may be conveniently designated, include falcons, hawks, kites, eagles, buzzards, harriers, and vultures, together with the so-called secretary bird of Africa and the American vultures; the two latter forming very aberrant groups, one or both of which are by some ornithologists regarded as constituting distinct orders. By the older naturalists the Accipitrines were placed at the head of the birds, but by common consent they have now to yield this position to the Passerines, which are, on the whole, the most highly-organized members of the entire class. It must, however, be remembered that, for their own particular mode of life, the organization of these birds is as perfect as it is possible to conceive; and, from the mechanical point of view, the spectacle of a falcon swooping on its quarry presents us with one of the very highest developments of bird life.

While agreeing with the owls and the ospreys in their desmognathous palate, their hooked beak and curved talons, and the presence of a cere, the Accipitrines

(1938)

differ from both in that the fourth toe is not reversible, while they resemble the latter and differ from the former in their laterally-directed eyes, which are never surrounded by complete discs, and their firm plumage. In the bones of the leg the tibia differs from that of the owls in possessing a complete bony bridge at the lower end, while in the typical forms this lower end is remarkably flattened from back to front. The canon bone, or metatarsus, as shown in the accompanying figure, is also longer than in the owls and ospreys, and lacks the bridge at the upper end found almost universally in these groups, while at its lower end the three trochleæ, instead of forming a very high arch when seen from below (compare the figure on p. 1904), are situated in nearly the same transverse plane. Hence the metatarsus at once serves to distinguish an owl or an osprey from an Accipitrine. In addition to its bridged palate, the skull of an Accipitrine agrees with that of an owl in the absence of any production of the lower mandible beyond its point of articulation with the quadrate bone, but it differs by its more elongated form. Like those of the owls, the young have a downy coat, but the eggs, although occasionally white, are very generally more or less colored, usually with reddish blotches on a pale ground. The whole group is carnivorous, like the owls and ospreys; but, while some of its members kill their own prey, others live on carrion. The Accipitrines may be divided into four distinct families, namely, the falcon group (*Falconidæ*), the vultures (*Vulturidæ*), secretary vultures (*Serpentariidæ*), and American vultures (*Cathartidæ*). The first two of this family are closely allied; the other two differ greatly both from the first two and from one another.



THE LEFT CANON BONE OR METATARSUS OF THE BUZZARD.

From the upper (A), front (B), lower (C), and hinder (D) aspects. *c, d*, hinder processes of upper end; *a, b*, points of muscular attachment; *f*, foramen; *h*, facet for first toe.

THE HAWK TRIBE

Family *FALCONIDÆ*

The present family, which includes the falcons, hawks, kites, buzzards, eagles, etc., constitutes together with that of the vultures the typical Accipitrines, which are collectively characterized by the following features: In the head the nostrils are separated by a median partition, while on the base of the skull there are no basipterygoid processes. The feathers have well-developed aftershafts, and the

oil gland is crowned with a circle of feathers. Inferiorly the windpipe is provided with an organ of voice. Although very closely connected by the lammergeier, the falcons and their allies differ from the vultures (except the lammergeier) by the head being clothed with true feathers, and by the size of the females exceeding that of the males. The group includes the smallest members of the order, while its largest representatives are second only in size to the vultures. As a rule, these birds subsist mainly or exclusively on prey killed by themselves, although some will eat carrion, and a few feed on honeycomb. Like other Accipitrines, the two sexes associate in pairs, which mate for life, while the number of young produced in a brood seldom exceeds four, and is frequently less. They have a cosmopolitan distribution and may be divided into five subfamilies.

True Falcons The true falcons, as represented by the peregrine and the kestrel, are the typical members of a subfamily, characterized by the length of the tibia being considerably greater than that of the metatarsus, by the scutes on the hinder aspect of the metatarsus being arranged in a reticulate manner, and by the sides of the bill being notched. In all of them the cere is large, and often brightly colored. With regard to the extent of the genus *Falco*, there is a certain amount of difference of opinion among ornithologists, some including in it the whole of the European falcons, while others separate the gerfalcons (as *Hierofalco*), and the kestrels (as *Tinnunculus*, or *Cerchneis*). Used in the wider sense, the genus will include (with the exception of one peculiar species from the Argentine and another from New Zealand) all the falcons in which the nostrils are circular and furnished with a distinct tubercle in the middle. The beak in all is short and curved, with one notch in the upper mandible; the wings are long and pointed, with the first and third quills of equal length, and the second the longest, and the toes are elongated. Many of the larger species have a distinct dark stripe on the cheek, which in the peregrine expands into a large patch. All are subject to great variation of plumage, according to age, which renders the discrimination of many of the species a matter of exceeding difficulty.

Gerfalcons Under the common title of gerfalcons are included several closely-allied falcons of large size, from the northern regions of the Northern Hemisphere, distinguished by the comparative shortness of the toes, more especially the fourth, which (exclusive of the claw) is about equal in length to the second. The wings, moreover, are rather short, and the length of the interval between the tips of the primary and secondary quills does not exceed half the length of the tail. The beak is somewhat elongated, and the color of the plumage tends to slaty gray, or white, these being the only falcons in which there is such a type of coloration. One of the best known of these species is the Greenland falcon (*Falco candicans*), of Greenland and North America, young birds occasionally straggling to the British Islands. This is the lightest-colored member of the group, and is hence sometimes termed the white gerfalcon. Its distinctive characteristics are to be found in the yellow tint of the cere, beak, and claws, and by the ground color of the plumage being white at all ages. In old birds, the head, under parts, and tail become almost, or completely, white; while the upper parts retain small black spots. In the young the breast and flanks are longitudinally streaked with brown. The length of the



THE GREENLAND FALCON.

(1941)

female reaches twenty-three inches. In the Iceland falcon (*F. islandicus*) the beak and claws are of a dusky-horn color, and the plumage darker than the last; its ground color being brown in the young and gray in the adult. Moreover, in the adult the flanks have transverse arrowhead dark bars, and the tail is likewise barred; the crown of the head being lighter colored than the back. In young birds the dark markings on the under parts are longitudinal; this change from longitudinal to transverse bars being common in the group. The home of this bird is Iceland, from which a certain number of individuals migrate to the southeast, a few from time to time reaching Britain. The Norway, or true, gerfalcon (*F. gyrfalco*) is a somewhat larger bird than the last, with the crown of the head as dark as or even darker than the back, and the whole tone of the plumage tending more to brown. It has also frequently a distinct cheek stripe, while the wings are relatively longer, and the tail shorter. This falcon inhabits all Northern Europe and Asia, as well as North America, and migrates southward in winter, although not reaching Britain. It is replaced on the Labrador coast by the still darker Labrador falcon. The habits of all the gerfalcons are probably very similar; although, from the general absence of trees in its native country, the Greenland species is compelled to breed exclusively on cliffs, while the others often resort to trees. The eggs are usually three or four in number, and are of a creamy-white ground color, blotched with cinnamon or reddish brown. All of them are extremely shy, but display great boldness in defense of their nest, circling round the head of the aggressor with loud screams. When sitting on its nest in the snow, with its white breast toward the hunter, the Greenland falcon will often escape detection. Their prey consists chiefly of waterfowl and ptarmigan. Gerfalcons, and especially the white kind, were formerly much esteemed in falconry, and commanded high prices; the white Greenland falcons exported to the Continent being captured in Iceland. Although larger and more powerful birds, all the gerfalcons lack the supreme dash and "go" of the peregrine, and their former estimation was probably mainly owing to their size and beauty.

Saker Falcon The large and handsome falcon, known as the saker (*Falco sacer*), a term apparently derived from the Arabic, is a southern form, agreeing with the gerfalcons in the proportionate length of its toes and wings, but differing markedly in its plumage. In length the male saker measures upward of eighteen and one-half inches, while the female falls but little short of twenty-five inches. By this large size and the relative length of the claws, the saker may be readily distinguished from all the other falcons of Europe and Asia. In its ordinary dress, as shown in the accompanying figure, it is further characterized by the upper surface of the tail feathers, instead of being completely barred, having whitish bars on the inner webs, and spots on the outer ones, these spots being especially marked in the middle pair. Then again the cheek stripe, if present at all, is very narrow. The head is pale rufous, sometimes turning nearly white, with narrow black stripes along the middle of the feathers. The general color of the upper parts is pale brown, with the feathers margined with rufous; while the quills are darker brown, with white or rufous markings, and the pale tail ornamented in the manner noticed. The sides of the face and throat are white, while the rest of the under parts are

whitish, with longitudinal streaks of brown, which are largest on the flanks and abdomen. The cere and feet are yellow, while the beak is greenish horn color. In the young bird the feet are bluish green. When in its full adult dress, which is not assumed till late, and but seldom seen, the saker becomes completely barred on the whole of the upper surface with rufous, and is then compared by Dr. Sharpe to a gigantic kestrel; the under parts being creamy white, with a few blackish spots on the abdomen passing into bars on the flanks.



SAKER FALCON.
(One-third natural size.)

The range of the saker extends from Southeastern Europe and Northeastern Africa through Central Asia to the north of China. Although not definitely known to breed in the plains of India it extends from Afghanistan and Gilgit to Peshawur, and thence straggles as far south as Dehli and Amballa. *F. milvipes*, of Central Asia, is now regarded as a distinct species. This noble falcon is common in the Danubian principalities, and generally frequents open country, although nesting in

trees—usually in the neighborhood of water. The nest is not large, and the eggs, which are generally four in number, are more pointed than those of most Accipitrines. In the Harriana desert of India these falcons feed largely on a spiny lizard of the genus *Uromastix*. In Palestine the saker is trained for the chase of gazelles, while in India, where it is termed the cherug, it is flown not only at cranes, bustards, hares, etc., but likewise at kites. The chase of the latter is described as being exciting in the extreme, the two birds doing all they know to obtain the higher position, and often flying far from the hawking party. On one such occasion, Mr. R. Thompson, writing to Mr. Hume, says that “after going a considerable distance from his quarry, and thereby acquiring what he wanted—superior height—the saker resumed the chase, returning downward like a thunderbolt on the kite. Blow after blow was struck, and the helpless kite, with his merciless enemy, descended, clutched fast together, their wings expanded, in wheeling circles to the earth, where the kite, already half dead, was soon dispatched.” Curiously enough, kites seem to recognize the saker as their enemy, as, immediately one was unhooded, all the kites in the vicinity flew off, although they took not the least notice of other falcons.

**Lanner and
Laggar
Falcons**

The falcon known as the lanner (*F. feldeggii*), although a much smaller bird, has been frequently confounded with the preceding species, but, together with the laggar, it belongs to a group agreeing with the under-mentioned peregrine in the relative length of the toes and wings, although resembling the saker in the absence of the distinct dark barring on the thighs in the ordinary dress. The lanner is chiefly characteristic of the countries bordering the Mediterranean, and attains a length of seventeen inches in the male. It has the back barred, the forehead blackish, and the hinder part of the head and nape rufous, with a narrow line of black on the forehead, and a thin black cheek stripe; the general color of the upper parts being ashy brown, and the tail feathers distinctly barred with pale rufous. The laggar (*F. jugger*), which is confined to Peninsular India, is a still smaller species, measuring only fifteen and one-half inches in the male, and having the thighs with scarcely any or no dark markings, and the middle tail feathers not barred; the crown of the head being dull rufous, with lines of ashy black on the back. Other well-known species of this group are the Barbary falcon (*F. barbarus*), ranging from West and North-east Africa to Northwestern India and the Himalayas, and the red-capped falcon (*F. babylonicus*), with a nearly similar range, but extending into Turkestan, and unknown in West Africa. The former is next in size to the saker, the female reaching a length of twenty-two and one-half inches, and may be distinguished from the lanner by the rufous forehead and nape, and the bluish gray of the hinder part of the crown. The latter is much smaller, and has the under parts uniform sandy rufous, instead of with wavy dark bars.

**Peregrine
Falcons**

In common with the group just noticed, the peregrine falcon (*F. peregrinus*)—so named from the migratory habits of the young birds—differs from the gerfalcons and saker by its longer toes, especially the fourth, which (exclusive of the claw) exceeds the second in length, and also by the elongation of the wings, in which the interval between the primary and second-

ary quills is greater than half the length of the tail. The peregrine, which attains a length of fifteen inches in the male and seventeen in the female, is easily recognized by the distinct narrow black transverse bars on the thighs, the blackish color of the crown of the head, and the expansion of the cheek stripe into a large black patch. In the adult the whole of the crown of the head, the nape, and the space below the eyes are nearly black; the back, wing coverts, and



PEREGRINE FALCON.
(One-third natural size.)

tail some shade of bluish gray, with darker bars; the primary quills brownish black, with the inner webs barred and spotted with reddish white; the throat is nearly white, and the breast reddish white, with short, dark brown transverse bars; the remainder of the under parts, as well as the lower surface of the tail, being marked with more continuous bars of brown and gray. The beak is blue, tending to black at the tip, and the cere, legs, and toes are yellow. Such is the general

coloration of the typical northern peregrine, which ranges over all Europe, except Iceland and Spitzbergen, while eastward it extends across Siberia to China and Japan, and thence to the Malay islands. It also occurs in North-eastern Africa, as far as Kordofan, and occasionally straggles as far as the Cape, where, however, its place is normally occupied by the very distinct lesser peregrine (*F. minor*). Entering India on the extreme northwest, it is replaced in the peninsula by the shahin falcon (*F. peregrinator*). In Java we meet another southern form, known as the black-cheeked falcon (*F. melanogenys*), which ranges



CAST OF PEREGRINES—RED FALCON AND BLUE TIERCEL.

to Australia, and is distinguished by its redder and more finely-barred plumage. Ornithologists are now pretty well agreed that the peregrine of North America—where it is commonly known as the duck hawk—is merely a variety of the European species, but in Chili and the adjacent parts of South America we meet with another form, apparently allied to the black-cheeked falcon, and known as *F. nigriceps*, or *F. cassine*.

Breeding on the cliffs of the sea coast in the south, and in the more mountainous districts in the interior of the country, the peregrine is best known in England

as a migrant. These migratory individuals are chiefly birds of the first year, and are most commonly met with in autumn; but there are also a certain number of old birds which make their appearance in spring on their northward journey. Although nearly always nesting on some lofty cliff, there are instances of its having bred in an open marsh, and also in a tree. The nest is usually of large size, and generally contains four eggs, which are remarkable for the depth of the color of their red blotchings. Feeding chiefly on birds of different kinds, the peregrine undoubtedly kills a considerable quantity of game. Professor Newton is of opinion, however, that the harm it inflicts is not so great as might at first appear to be the case, since all falcons invariably seize the weakest birds, and the elimination of such weaklings is probably to the general advantage of the breed. In North America, although by no means common, the peregrine is the most numerously represented of all the larger falcons. Captain Bendire writes that in the northern portion of its range it is only a summer resident, following the immense flocks of water fowl during their migrations. "Hares, ptarmigan, grouse, bob whites, pigeons, as well as smaller birds, enter largely into its bill of fare, and the poultry yard as well occasionally suffers. Next to the goshawk, the peregrine falcon is our most audacious bird of prey. Its flight, when once fairly started in pursuit of its quarry, is amazingly swift; it is seemingly an easy matter for it to overtake the fleetest of birds, and when once in its grasp resistance is useless. I have seen this falcon strike a teal almost within gunshot of me, kill it apparently instantaneously from the force of the shock, and fly away with it without visible struggle, and as easily as if it had been a sparrow instead of a bird of its own weight."

Use in
Hawking From its docile disposition, its powerful flight, and the ease with which it can be procured, the peregrine has always been a favorite bird in falconry, and is the one most commonly employed in the modern revival of that sport. In falconry it is the female only that is termed the "falcon"; the male bird being designated the "tiercel," corrupted into "tarsel." While the tiercel was commonly flown at partridges and occasionally at magpies, herons, and next to them rooks, were the favorite quarry for the falcon. In heron hawking, the birds were intercepted on their way home, and, if possible, when flying against the wind. When a heron was viewed, a cast or pair of falcons was loosed; and thereupon pursuers and pursued immediately began to try and soar above the other, the heron lightening himself by disgorging his food. The falcons fly in a spiral, and as soon as one has gained a position of advantage and made its swoop, it should be succeeded by its fellow, the manœuvre being repeated until the heron is brought to the ground. In striking, the falcon attacks only with its claws, and not, as often represented, with its beak. In India the peregrine, locally known as the bhyri, used to be employed by the native chiefs in hawking egrets, stalks, herons, cranes, etc., only a single bird being flown at each quarry. The smaller shahin, or royal falcon was, however, held in still higher estimation for this sport. It may be added that the shahin differs from the peregrine by the more rufous tinge of its under parts, and its dark head and nape.

With the Indian turumti falcon (*F. chicquera*), which scarcely exceeds the common kestrel in size, we come to much smaller representatives of the present section

Turumti Falcon of the genus. This species resembles the peregrines in having the feathers of the thighs distinctly barred, but is at once distinguished from that group by the chestnut-colored head, nape, and cheek stripe. The rest of the upper parts are pale gray, with dark markings, the quills being dark slaty, and the tail light gray, with a broad black terminal band tipped with white. The lower surface is white to the breast, behind which there are narrow crossbars



TURUMTI FALCON.
(Three-eighths natural size.)

of dusky gray. The beak is greenish yellow at the base, while the cere and legs are bright yellow. This species is confined to India, but is replaced in Africa by the rather paler tawny-headed falcon (*F. ruficollis*), which is perhaps only a local race. The female attains a length of thirteen, and the male of eleven and one-half inches. The turumti is spread all over India, generally haunting open country in the neighborhood of cultivation. Jerdon writes that "it frequents gardens,

groves of trees, and even single trees in the open country, whence it sallies forth, sometimes circling aloft, but more generally, especially in the heat of the day, gliding with inconceivable rapidity along some hedgerow, dam of a tank, or across fields, and pouncing suddenly on some lark, sparrow, or wagtail. It very often hunts in pairs, and I have now and then seen it hover like a kestrel for a few seconds." In addition to the smaller birds, the turumti will attack starlings, quails, and doves, while it will sometimes prey on bats. It nests from February to May,—apparently always in trees,—laying usually four eggs, of which the color varies from yellowish brown, with a few reddish specks, to nearly uniform brownish red. Mr. R. Thompson, in a letter to Mr. Hume, observes that "I have trained this species to be thrown from the hand at quails and partridges. The bird readily learns the lesson, and makes a good bag. The quail or partridge is allowed a good start, the turumti being held up so as to eye the receding bird, and then thrown in the direction of the latter, with some force, shooting off at once, more like a dart than anything else, at the quarry."

Hobby

The hobby (*F. subbuteo*) is one of the most elegant of the British falcons. It belongs to a group in which the thighs are perfectly uniform; their color in this species being rufous, while the throat and breast are white, and the latter marked with black stripes. Above, the general color is dark slaty gray, tending to black on the head. The length is eleven and one-half inches in the male and thirteen and one-half in the female. The hobby is a migratory species, ranging over Europe and Northern Asia, and extending into India and North China, while in winter it journeys to South Africa. By no means numerous in Britain, it is still not uncommon in the inland wooded and cultivated districts of the south of England. In addition to preying on small birds, it also feeds on dragon flies and beetles, and is thus a benefactor to the farmer.

Merlin

Our last representative of the typical falcons is the well-known merlin (*F. æsalon*), which, together with the smaller pigeon hawk (*F. columbarius*) of North America, may be distinguished from other members of the genus by the longitudinally streaked thighs and the nearly uniformly-colored back, in which the feathers have only a median dark streak. Above, the color of the merlin is a uniform clear bluish gray, with the tail marked by one broad band near the end. The head is dark slaty, with broad median stripes to the feathers; the forehead and sides of the face whitish, with narrow median lines; the ear coverts grayish; the throat white, and the remainder of the under parts white tinged with rufous, with broad median black streaks, becoming narrower on the thighs. In the young bird (shown in the lower figure of our illustration) the general color of the upper parts is brown with a faint tinge of gray, and the feathers margined with sandy rufous; while on the under parts, save the throat, the whitish feathers have very broad reddish brown streaks and black median stripes, the thighs having smaller brown spots, and the lower part of the abdomen and under tail coverts being only sparsely marked. It is probable that very old female merlins assume a blue plumage like the males. The adult male measures ten inches, and the female about two inches more. The merlin is an inhabitant of Europe and Northern Asia, but extends southward into India and China. An anonymous cor-

respondent of the *Times* observes that "on the bleak hills of Wales, round the Peak, and in the wildest Midland heights, further north on the barren moors and bold bluffs of Yorkshire, over the rugged and romantic ranges of Scotland, on the short turf of the downs, in the mountain heather, by the slaty and granite boulders of upheaved rocks, the merlin has its home. Even in the desolate regions it affects, no member of the pariah family is free from attack; yet, like the other small falcons,



MERLINS.
(Two-fifths natural size.)

it holds its own against the destroying band, and manages to live on and do its appointed work against all odds." In Britain the merlin usually nests on the ground, generally on the open moors; but in Lapland and other parts of the continent it commonly takes possession of the deserted nest of some other member of the family, while in other cases it lays on a shelf of rock. When on the ground, scarcely any nest is made. The eggs, which vary from four to six in number, are

frequently of a uniform brick-red color, but they may be mottled with a darker shade. The merlin commonly preys upon small birds, and has been trained to fly at snipe, larks, thrushes, etc. According to Messrs. Salvin and Brodrick, "the strongest female merlins may be trained to fly pigeons admirably, and from their small size, and the way in which they follow every turn and shift of the quarry, are better adapted for this chase than the peregrine; unlike it, they do not stop when the pigeon takes refuge in a hedge or tree, but dash in and generally secure it."

In addition to its smaller size and much darker general color, the American pigeon hawk is distinguished by having four black bars on the tail, of which the last is much the widest. This falcon is a migratory species, with a swift and powerful flight, breeding in open nests or hollows of trees, as well as on cliffs, and in cavities in the banks of rivers. The following interesting anecdote is given by Mr. R. Macfarlane regarding this species. On the twenty-fifth of May, 1864, an Indian in his employ "found a nest placed in the midst of a thick branch of a pine tree at a height of about six feet from the ground. It was rather loosely constructed of a few dry sticks and a small quantity of coarse hay; it then contained two eggs; both parents were seen, fired at, and missed. On the thirty-first he revisited the nest, which still held but two eggs, and again missed the birds. Several days later he made another visit thereto, and, to his surprise, the eggs and parents had disappeared. His first impression was that some other person had taken them; after looking carefully around he perceived both birds at a short distance, and this led him to institute a search which soon resulted in finding that the eggs must have been removed by the parent birds to the face of a muddy bank at least forty yards distant from the original nest. A few decayed leaves had been placed under them, but nothing else in the way of lining. A third egg had been added in the interim."

Kestrels The small falcons, of which the common kestrel or windhover is the most familiar representative, constitute an extensive and easily recognized group of the genus, distributed all over the globe with the exception of Oceania. They are all short-toed birds, agreeing with the gerfalcons in the proportionate lengths of the second and fourth digits; but resembling the peregrines in the length of their wings, as shown by the interval between the tips of the primary and secondary quills exceeding half the length of the tail. They have a peculiar and characteristic type of coloration, easy of recognition but difficult of description; and in the majority of the species (as shown in the figure of the lesser kestrel on p. 1953) the plumage is very differently colored in the two sexes, the hen bird being barred, while the cocks are more uniform. Although the common kestrel feeds chiefly on mice, many of the other species subsist to a great extent on insects.

The common or true kestrel (*F. tinnunculus*) derives its name of windhover from its habit of hanging suspended in mid-air, with its wings in rapid motion, its fan-like tail spread out, and its head directed to windward. When in this position it spies a mouse or small bird below, it drops upon it suddenly and noiselessly with unerring aim. The male kestrel, which attains a length of twelve and one-half inches, has a yellow cere and limbs, bluish beak, and black claws. The crown of the head, nape, and cheeks are ashy gray with dark streaks; the upper parts reddish fawn, with a small black spot on each feather; the quills blackish gray with

lighter margins; and the tail feathers ashy gray, with a single broad black band near the end, and the extreme tips white. Beneath, the general color is pale rufous fawn, with dark spots or streaks, both of which disappear on the thighs and under tail coverts; while the tail is grayish white with indistinct bars. The female, which scarcely exceeds her consort in size, differs by the top of the head being reddish fawn with dark streaks, the upper parts being banded with bluish black, and the tail rufous with several incomplete black bars. The young males are nearly like



THE KESTREL.
(One-third natural size.)

the females, the tail changing blue first and the head last. Our illustration represents a female in which the bars are not so well defined as in some specimens. A further specialization in the kestrel would involve a similar change of color in the female; and to this there is an approximation in a dark southern race, where the rump and part of the tail of the hen bird tend to blue. The kestrel ranges over the whole of Europe and Northern Asia, migrating in winter into the north of China, India, and Northeastern Africa, and occasionally straying into the western and southern parts of the latter continent. It is replaced in the New World by the so-

called American sparrow hawk (*F. sparvorius*), in which the centre of the crown of the head of the male is rufous, and the wing coverts blue with black spots. Although its chief food consists of mice and voles, the kestrel occasionally kills small birds, and will also eat frogs, beetles, worms, and grubs, while in India it frequently devours lizards. That it will occasionally kill a young partridge or chicken is doubtless true, but such small robberies are far more than counterbalanced by the benefits it confers on the agriculturist by the destruction of hosts of pernicious



LESSER KESTREL.
(Two-thirds natural size.)

rodents, and it ought therefore to be carefully preserved, instead of being ruthlessly shot down. Although occasionally placed in a hollow tree, the nest is more generally situated among rocks or old buildings, while still more frequently the deserted nest of some other bird, such as a crow, magpie, or raven is taken advantage of. The eggs, usually four or five, but sometimes six in number, may be either mottled all over with brownish red or orange, or blotched with these colors upon a light

ground. They are generally hatched late in April, or early in the following month.

The lesser kestrel (*F. cenchris*) is an inhabitant of Southern and Southeastern Europe, migrating in winter to South Africa, and while scarcely smaller than the common species, has shorter wings. In the adult male the head, hinder neck, rump, upper tail coverts, and tail are bluish gray, the latter having a broad subterminal dark band and a white tip, while the whole of the back is cinnamon rufous, without any black spots. The throat is yellowish white, and most of the other under parts are cinnamon colored with small black spots, becoming larger on the sides of the body, but disappearing on the thighs, which are uniform pale rufous. Although the cere and limbs resemble those of the common species in color, the claws are generally white. The female is very similar to the hen of the common species, although lighter in color, and with white claws. Spain, Malta, Southern Italy, and especially Greece, are some of the countries where the lesser kestrel is most common, but it also ranges into Syria, Turkey, Asia Minor, and Persia, and has been obtained from the steppes of Western Siberia. It may be seen on the Acropolis of Athens, the churches of Madrid, and the Moorish temples of Granada. In Greece and Spain it nests late in April or early in May, selecting either buildings, rocks, or hollow trees for its breeding place, and being often found in company with the ordinary kestrel. In Malta it may be seen in flocks, where, according to Leith-Adams, its prey is chiefly small birds. Leith-Adams says that both kinds of kestrel were held in high veneration by the ancient Egyptians, their function being supposed to be to investigate, in conjunction with Anubis, the actions of the soul. Their destruction involved the penalty of death, and "no trouble was spared in preserving them, so that, besides the sacred birds in captivity, it was customary to place food in the way of wild individuals. The kestrel, therefore, must have enjoyed unbounded freedom and protection, and it is a remarkable circumstance nowadays, that, being one of the most common rapacious birds of Egypt, it is far more familiar than any of the others, allowing man to approach it within a few yards."

Pygmy
Falcons As there are pygmy parrots and pygmy owls, so there exist diminutive representatives of the falcons, which, although not larger than larks, are as bold and dauntless as their larger relatives. These pygmy falcons range from the Eastern Himalayas, through Tenasserim and Burma to the Malayan islands, and thence to the Philippines, and are also represented by an outlying species in the Nicobar islands; and since they differ from the true falcons by their oval nostrils, which have neither a central tubercle, nor an overhanging flap of skin, they are referred to a distinct genus. The beak is short, with a sharp tooth, and a notch on each side, often described as a double tooth. The wings are short, and the tail is of no great length, while the third toe is not much longer than the others.

The black-legged falconet (*Hierax fringillarius*) represented on p. 1955 inhabits Tenasserim, the Malay Peninsula, Java, Sumatra, and Borneo, and measures six and one-tenth inches in length. The upper parts, together with the quills and tail feathers, are deep bluish black, with the inner webs of the two latter barred with white. The forehead, together with a stripe running from the eye down the

side of the neck, and likewise the front of the cheek, the throat, and breast are white, while the abdomen is tinged with rufous. The lores and the space behind the eye, as well as the sides of the body and the outer aspects of the thighs, are glossy black. The bill and feet are dark; although in young birds the former is yellow at the base. The white-legged falconet (*H. melanoleucas*) of Cachar and Assam differs by its white abdomen and thighs; while the Philippine falconet (*H. erythrogenys*) is distinguished from the latter by its black thighs. The smallest of all is the red-legged falconet (*H. caeruleus*), which measures only five and one-half inches, and ranges from Nipal and Sikkim, through Tenasserim and



BLACK-LEGGED FALCONET AND ITS PREY.
(One-half natural size.)

Burma, to Cambodia. It is distinguished from all the others by its white legs, and derives its name from its rufous thighs. All the falconets are quick and active in their movements, making their way with a rapid and direct flight, during which the wings are constantly flapped. They are generally to be seen hawking insects with swallow-like speed, and when tired are said invariably to select a dead branch upon which to rest. Their chief food appears to consist of dragon flies, beetles, and butterflies; although they undoubtedly at times attack and kill birds, which may exceed themselves in size. Davison writes that he has seen a black-legged falconet swoop at a rock thrush, and he once shot a male with a living and partially-plucked swallow in its talons. All the species nest in hollow trees, making at the bottom

of the cavity a pad of the wings of dragon flies and butterflies, upon which to lay their eggs. The latter are white, but the number in a clutch does not appear to be ascertained. It is said that the Malays train the falconets for hawking, throwing them from the hand at the quarry.

The three remaining genera of falcons are distinguished from the foregoing by their oval nostrils being provided with an overhanging flap of skin. In this group the oval nostrils have the long axis parallel or oblique to the bill, whereas in the pygmy falcons it is at right angles to it.

Mississippi
Falcon



MISSISSIPPI FALCON AND SWALLOW-TAILED KITE.
(One-half natural size.)

Of these genera, the one to which the Mississippi falcon belongs is characterized by the bill having but one notch, and by the wings reaching to the tip of the tail; whereas in the other two (*Baza* and *Harpagus*) the beak has two notches, and the wing does not reach the end of the tail. The Mississippi falcon (*Ictinia mississippiensis*) is one of the two American species which are the sole representatives of the genus, and are characterized by the leaden-black plumage of the upper parts, and the gray head, neck, and under parts. In the figured species the secondary feathers of the wing are silvery gray, like the head; whereas in the other (*I. plumbea*) they

are of the same black hue as the primaries; this species being also distinguished by the presence of three white bars on the tail. The Mississippi falcon, which ranges from the Southern United States to Guatemala, is thirteen and one-half inches in length, while the other species, which is a fraction larger, extends from Mexico to Brazil.

In its native land, where it is generally known as the Mississippi kite, the figured species is a common bird in many districts, more especially in parts of Texas. Its favorite feeding grounds are said to be the cotton fields, where it may be seen at one moment soaring high in the air, and soon after just skimming above the tops of the plants, or flying between the rows. It seldom alights, but may now and then be observed perched on some dead tree, when it suffers itself to be approached within fifteen or twenty yards before taking wing. The food of this species is believed to consist mainly of large insects, probably supplemented with small rodents and reptiles. The nest is built in a tree, usually in a fork, and may be used for two or more seasons in succession. Usually but two or three eggs are laid, which differ from those of most members of the family in being of a uniform bluish-white color, without spots. In defense of their nest and young these birds are said to display great courage.

Crested
Falcons The crested falcons, of which there are several species ranging from India through Malayana to North Australia, and to Africa, and Madagascar, differ, as we have seen, from the last genus by having two notches on the edge of the beak and by their shorter wings; while they are distinguished from all other members of the subfamily by the crest of elongated feathers at the back of the head. These birds vary from fourteen to seventeen inches in length, and many of them are remarkable for their handsome coloration. The Indian representative of the genus is the black-crested falcon, or, as it is commonly called, kite (*Baza lophotes*), which has the plumage of the upper parts of a glossy greenish black, and a uniformly black tail. It is a rare bird, frequenting forests, and feeding almost exclusively on insects. The other species have the tail brown or gray, with darker bars; some, like the Philippine crested falcon (*B. magnirostris*), having the breast marked with broad transverse bars of white and chestnut; while in the West-African cuckoo falcon (*B. cuculoides*) the brown bands are narrower, less continuous, and confined to the sides of the body beneath the wings. Three Central and South-American falcons, constituting the genus *Harpagus*, differ from the crested falcons by the absence of the plume of feathers, and also by the presence of a tubercle in the centre of the nostrils.

THE EAGLE-LIKE SUBFAMILY

The preceding genera are included, as we have seen, in the subfamily *Falconinæ*; and we now come to a second subfamily, known as the *Aquilinæ*, which includes the honey buzzards, kites, eagles, etc. The members of this group differ from the last by the sides of the beak being simply festooned, instead of

notched; although they resemble them in having the hinder aspect of the metatarsus reticulated, that is to say, with the scales small and polygonal. As regards their insectivorous habits, the Mississippi and crested falcons serve to connect the more typical members of the preceding subfamily with the kites. In the whole group the nostrils are not concealed by plumes.

A rare visitor to the British Islands, the honey buzzard (*Pernis mellivora*) is a well-known although locally distributed bird on the Continent, and is the only European representative of the small genus to which it belongs. The honey buzzards agree with a considerable number of other genera in having the lower portion of the metatarsus bare, the length of the naked part being, however, less than that of the third toe, exclusive of the claw, and also in the oblique form of the nostrils, which are generally closed in by a membrane, so as to render their aperture little more than a slit. They are more specially characterized by the tail being rounded, with the outer feathers inferior in length to the middle pair. From their immediate allies they are distinguished by the shortness of that portion of the beak in advance of the cere, as compared with the third toe, while the bill itself is stout and the feathers on the lores short and not produced beyond the hinder edge of the nostril. The wings are long and large, and the tail also elongated; the toes are of moderate length, and the claws but slightly curved. The shortness of the feathers on the lores, together with its peculiar gait, which has been compared to the running of a hen, render the honey buzzard the most unhawk-like of all the British representatives of the family. It is subject to a great amount of variation in the color and markings of the plumage, more especially in birds of the first and second year. Generally speaking, it may be said, however, that the adult male (as shown in our upper figure) has an ashy-gray head, brown upper parts, with the feathers margined with a lighter tint, and having a dark median streak, and the tail pale brown with the extreme tip whitish, and marked by three dark transverse bars. Beneath, the plumage is white, narrowly streaked with brown, such streaks expanding on the sides of the body into spade-shaped markings. As in our figure, there may be some white on the tips of the wing feathers. The iris is straw colored, the beak black, and the feet yellow with black claws. Young birds, as shown in the lower figure of our illustration, are generally brown or yellowish brown, with the shafts of the feathers distinctly streaked with black, and the under parts more rufous than the upper surface. The ashy-brown tail is broadly tipped with buffish white, and is crossed by two distinct chocolate bars, one near the end and the other near the middle, between which are a number of imperfect dark bars. The iris is hazel. The length of the adult bird is about twenty-five and one-half inches, so that it may be compared in size to a kite. The honey buzzard ranges over the greater part of Europe, and probably occurs in several parts of Northern Asia, as it has been recorded from Japan and near Pekin. In Sweden it breeds within the Arctic Circle, and it has frequently nested in England. During the winter it migrates to Arabia, Africa, and Madagascar. In India it is replaced by the crested honey buzzard (*P. ptilorhynchus*), a species ranging through the Malayan region, distinguished by the crest of the adults, and remarkable for its great individual varia-

tion, some individuals being light fulvous, while others are nearly black. A third species (*P. celebensis*) inhabits Celebes. The honey buzzard derives its name from its habit of feeding on the larvæ of bees and wasps, digging out the combs with its claws, and tearing them to pieces. It will, however, also eat adult insects of various kinds, together with worms, slugs, the eggs of birds, moles, and even grain. It may be taken in traps baited with wasp or bee comb, and in captivity has been known to kill and eat rats, as well as comparatively large birds. The nest is said to be generally placed at a considerable height from the ground in some tall oak, and is composed of lichen-clad sticks, lined with wool and the leaves of the oak

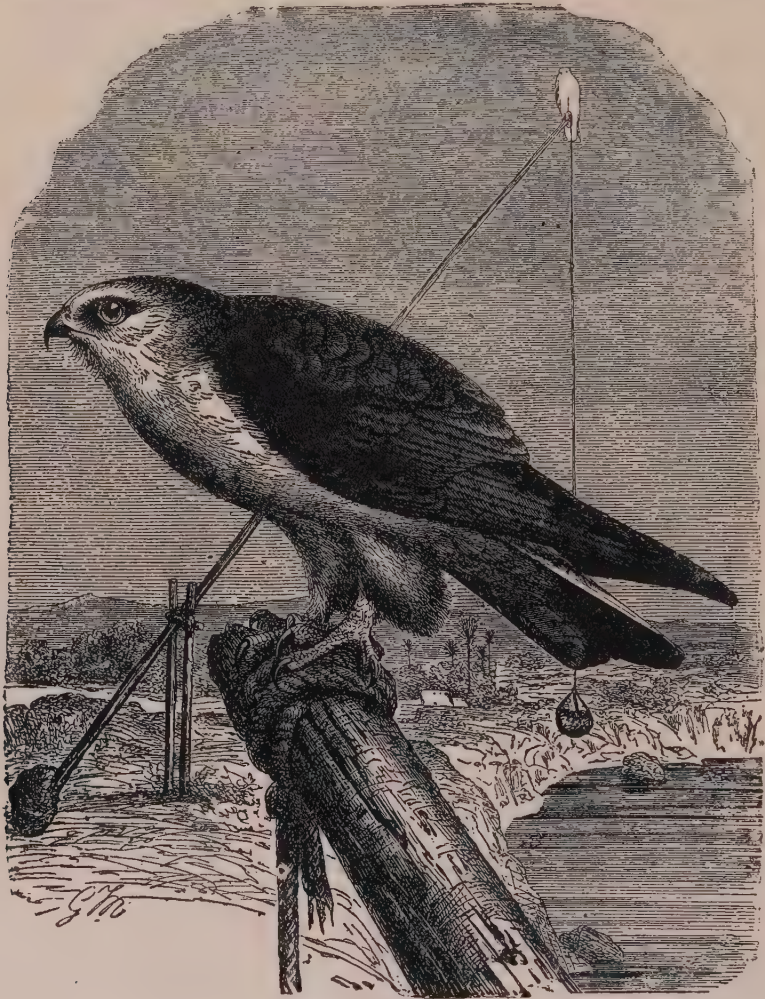


HONEY BUZZARDS.
(One-fifth natural size.)

and beech. . . . Professor Newton was informed by Mr. Newcome that in France the honey buzzard surrounds the nest, after the young are hatched, with a barrier of leafy boughs, which are renewed from time to time as the foliage withers, but whether this was to prevent the young from falling out, or to act as a screen, was not ascertained. The eggs are not more than three in number, and usually have a buffish-white ground color upon which are dark blotches.

A much smaller bird than the last is the black-winged kite (*Elanus* **Black-Winged** *cæruleus*), which is one of the best-known representatives of a small **Kite** genus widely distributed over both hemispheres. Agreeing with the honey buzzards in their nearly even or slightly emarginate tails, the hawks of

this genus differ by their more elongated bill, of which the length, in advance of the cere, is greater (instead of less) than half the length of the third toe, exclusive of the claw. They are further characterized by the extreme shortness of the bare portion on the front of the metatarsus, and also by the feathered lores, and the wings reaching to the end of the tail, these characteristics distinguishing them from certain allied genera which we have not space to notice. The black-winged kite is



BLACK-WINGED KITE.
(One-half natural size.)

an inhabitant of Southeastern Europe, Africa, and India, and attains a length of just over thirteen inches. Above, it is of a beautiful ashy-gray color, with the forehead and under parts white, and the shoulders and lesser wing coverts deep glossy black, the lores and a narrow streak above the eye being also sable. The iris is of a full carmine red, and the beak black, while the cere, like the feet, is yellow. In young birds the upper surface is brownish gray, with the under parts yellowish

streaked with brown, and most of the feathers with light borders, the iris being yellow. In America this species is replaced by the white-tailed kite (*E. leucurus*), easily distinguished by the feathers of the tail (except the middle pair, which are gray) being pure white; while two other species inhabit Australia, and a fifth the Philippines, Java, Borneo, and Celebes.

Mr. Hume writes that the black-winged kites hover over grass in the fashion of a kestrel, "but in a clumsier and heavier manner. The wings point upward, so that they are within three or four inches of each other, instead of being retained nearly horizontally as in the kestrel, and the legs and tail hang down unlike those of any other bird that I have noticed. Thus hovering, they after a time slowly descend, and when within a few feet of the ground generally drop suddenly. They are very tame, bold birds, passing unconcernedly within a few feet of a sportsman when busy hunting, over fields or grass, and sitting composedly on the bare end of a bough, while gun in hand one walks up to within a few paces of their perch." They are frequently to be seen sitting on the telegraph wires alongside the Indian railways, while in Egypt they may be observed (as shown in our illustration), perched on the summits of the long poles used for raising water from the Nile. The nests are usually placed in low trees; and the eggs have a creamy or bluish-white ground, sparingly streaked and blotched with pale yellowish brown, and are usually two or three in number. One of the Australian species usually nests in large companies; the nests being placed as near together as possible, and composed of twigs, lined with the cast pellets of the fur of the rodents on which the birds have fed. The black-winged species subsists chiefly on insects, but also devours rats and mice. The American white-tailed kite does not apparently breed northward of South California, but extends south to Argentina. Its habits seem to be very similar to those of the other species, but whereas in North America it usually lays four or five eggs, in Argentina the number reaches eight. Messrs. Sclater and Hudson write that "it is a handsome bird, with large ruby-red irides, and when seen at a distance its snow-white plumage and buoyant flight give it a striking resemblance to a gull. Its wing power is indeed marvelous. It delights to soar, like the martins, during a high wind, and will spend hours in this sport, rising and falling alternately; and at times, seeming to abandon itself to the fury of the gale, is blown away like thistle down, until, suddenly recovering itself, it shoots back to its original position. Where there are tall poplar trees, these birds amuse themselves by perching on the topmost slender twigs, balancing themselves with outspread wings, each bird on a separate tree, until the tree tops are swept by the wind from under them, when they often remain poised almost motionless in the air until the twigs return to their feet."

True Kites Although the term kite is now commonly applied to many members of the present family, it should properly be restricted to the species of the genus *Milvus*, and belongs, strictly speaking, only to the common or red kite (*M. iclinus*), also known in England as the glead. In Britain the kite is one of those species which has suffered most severely from incessant persecution, having gradually diminished in numbers from the time of Shakespeare, when these birds were to be seen in numbers on the Thames in London, till the present day, when it

is practically extinct in the southern and midland counties, although still lingering in the west and north. The kites belong to a group of five genera, easily distinguished from the foregoing members of the subfamily by their more or less deeply-forked tails, in which the outermost feathers are the longest. In the kites the forking of the tail is of moderate depth, and approximately equal in length to the interval between the tips of the primary and secondary quills, while the head is devoid of a crest. The wings are long, reaching nearly to the end of the tail, with the fourth or the third and fourth quills the longest, the beak slightly festooned, and the metatarsus and toes short, with claws of moderate length. There are some half-dozen species, exclusively confined to the Old World, where they range over all the continents and Australia. Kites are the scavengers of the hawk family, feeding chiefly on refuse and garbage, although also consuming insects, reptiles, and such young or feeble birds or mammals as they can capture. Spending most of their time on the wing, they soar gracefully in large, sweeping circles, and form a striking feature in the bird life of all eastern cities. Their nests may be built either in trees, buildings, or on rocks.

The common or red kite of Europe, represented in the lower figure of our illustration, attains a length of about twenty-four inches, and differs from all its congeners by its rufous tail and the general rufous tinge of the entire plumage. In old males the head and throat are whitish with brown streaks, the upper parts having the feathers dark brown in the middle with rufous edgings, tending to buff on the extreme margins, more especially in the wing coverts. The primary quills and primary coverts are black, with some white at the base of their inner webs; the upper tail coverts rufous, the tail feathers reddish brown, with their inner webs barred with dark brown, and the under parts rufous brown with a dark median streak to each feather. The beak is horn color, and the cere and iris, together with the legs and feet, yellow, the claws being black. The kite is distributed over the greater part of Europe, breeding as far north as the south of Scandinavia, and becoming gradually more rare in the eastern districts. In winter it ranges to Lower Egypt, Algeria, and Palestine. The nest is built either in the fork of a tree or, more rarely, in a cleft of rock, and the three or four eggs are laid in April or May. Nothing comes amiss to a kite when building, and, while the main framework of the nest is formed of sticks, these are supplemented by all kinds of rubbish, such as bones, fragments of leather, and rags, the latter forming the lining. When their nest is attacked, the parent birds make a vigorous resistance. As we have already had occasion to notice, the kite was a favorite quarry in hawking, showing excellent sport by the manner in which it endeavored to baffle the falcon in its efforts to gain the advantage of position. More rarely the kite itself was trained to fly at the smaller kinds of birds.

The black or migratory kite (*M. migrans*), represented in the upper figure of our illustration, is a rather smaller bird than the last, from which it may be distinguished by its dark brown tail, faintly barred with a still deeper tint, the general dark brown hue of the plumage of the upper parts, save on the head and throat, where the feathers are whitish with dark stripes. It is further characterized by the black beak, and the absence of any distinct patch of white at the base of the pri-

mary quills. This kite is distributed over the whole of Africa and Madagascar, from whence it migrates into Southern and Western Europe, while it occasionally reaches Scandinavia, and has been taken in England. Mr. H. Saunders observes that this kite appears on the Swiss lakes and rivers about the middle of April, and leaves early in the autumn. Frequently it may be seen fishing in the Lake of Geneva, and often, while one of a pair is engaged in this occupation, its fellow will be soar-



BLACK KITE AND RED KITE.
(One-fifth natural size.)

ing high in the air. Leith-Adams writes that as the red kites were formerly wont to play the part of scavengers in London, so do the black kites at the present day in the filthy lanes of Cairo. "Assisted by its ally, the Egyptian kite (*M. ægyptius*), which may be distinguished from the other on wing by the pale color of its bill, they hover over the refuse heaps, slaughterhouses, and wherever carrion and offal are collected, now pouncing on their food and bearing it off in their talons, or, with

that remorseless activity characteristic of the genus, pursuing pigeons, until the terrified birds, worn out by exertion, sink exhausted, and are dispatched by the enemy. Nor is this all: the fisherman has to keep a good lookout when he lands his net, as one or other is sure to be on the lookout for the small fry. They dispute the ownership of a bone with the lean pariah dog, or pick up refuse floating down the river; they hover over the farmer as he plows his field, and are the dread of a village from



EGYPTIAN OR YELLOW-BILLED KITE.
(One-fourth natural size.)

the number of chickens they pilfer. The nest is built in the top of a palm tree, where the Nubians catch them in traps baited with pigeons."

In India and the Himalayas the black kite is replaced by the smaller pariah or govind kite (*M. govinda*), the chil of the natives, distinguished by the well-marked patch of white at the base of the primaries. There is, however, in India another and larger species (*M. melanotis*), measuring upward of twenty-five and one-half inches in length, against twenty in the smaller species, and also distinguished by some differences in coloration, this larger species ranging eastward to China,

Japan, and Formosa. The pariah kite ranges to elevations of about eight thousand feet in the Himalayas, and abounds in every Indian city and village, where it performs the same useful offices as does the black species in Egypt. These kites frequently display the most astonishing familiarity and impudence; and the writer, when in camp, has seen a portion of his dinner snatched from a plate carried by a servant by one of these marauders. So numerous are they, that in Calcutta from two hundred to three hundred may be seen together at a time; and when the white ants are swarming, the air is sometimes almost darkened by the hosts of kites, buzzards, and crows, which collect to prey upon the flying insects. Their Indian name *chil* is given to them after their cry, which is a kind of long, tremulous squeal. Jerdon describes the flight of the Indian kite as bold, easy, and graceful, when the bird is once mounted aloft, although some heaviness is displayed in taking wing. In the air the bird "soars slowly about, in greater or less numbers, in large circles. When in pursuit of another kite, it is capable of considerable speed, and shows great dexterity in suddenly avoiding any obstacle and changing its course; in this its long tail is a great help. Occasionally one may be seen dropping down almost perpendicularly from the top of a house on a piece of offal in a narrow street, but in general it reaches the ground from a height by a series of oblique plunges." In the plains the breeding time lasts from January to April, although most individuals lay in February. The nest, which is very similar to that of the European species, is nearly always placed in a tree, and mostly in a fork. The usual number of eggs is two, although there may be three, and rarely four.

Distinguished from all its relatives, with the exception of an allied species, by its deeply-forked tail and extremely long wings, the swallow-tailed kite of America (*Elanoides furcatus*), with its striking piebald plumage, cannot be mistaken for any other member of the family. This bird, which is depicted on the right side of the illustration on p. 1956, may be compared in size to the pariah kite, its total length being twenty-one inches. As regards coloration, the entire head and neck, together with the hinder part of the back and rump and the whole of the under surface are pure white; while nearly all the rest of the upper plumage is black with grayish or purplish reflections in different regions. The beak is dark steely blue, the iris dark reddish brown, and the foot bluish white.

The range of this handsome and dashing bird extends from the southern states of North America to Colombia and Brazil, a few individuals being occasionally blown across the Atlantic to the western shores of Europe. Of its habits, Dr. W. L. Ralph writes to Captain Bendire as follows: "Excepting perhaps the turkey vulture, I think this bird is the most graceful of any while on the wing. It has the same easy, floating motion, but at times it flies very rapidly and turns very quickly, which is something I have never seen the former bird do. Their motions are very swallow-like, and that, with their forked tails, makes them look like gigantic swallows; and, like the chimney swifts, they have a habit of traveling together in small companies, usually consisting of three individuals, especially when they first return from the south. During the breeding season flocks consisting of from two or three to ten or twelve birds, but oftener of three, may be seen following one another

around, frequently uttering their calls, and circling in and out among the tree tops so fast as to make one dizzy to look at them. Except during this season, one seldom sees one of these birds unless it is flying, and I have often wondered if they did not at times sleep on the wing. At least I know that they usually, if not always, eat while flying; for I have many times seen one sailing leisurely along, occasionally bending its head to tear a piece from a small snake that it held in its talons, and I have never seen one alight on its food, as other birds of prey do. When hunting, they fly close to the ground, like marsh harriers, but at other times they sail above the tree tops, and sometimes so far above that it takes a good eye to see them. Their food consists almost entirely of reptiles; small snakes seem to be a favorite article of food with them. I have never seen one catch a bird, and believe they do not. This habit of eating snakes has given them the name of snake hawk among the natives of Florida." These birds begin to arrive from the south in the latter state about the middle of March, but do not become common till two or three weeks later. There they nest in April, usually building in tall pines, frequently at a height of ninety, and sometimes as much as a hundred and thirty feet from the ground. The nest is a very irregular structure of mossy twigs, and usually contains two eggs, spotted and blotched with rich brown and ferruginous. The African swallow-tailed kite (*Nauderus riocouri*) is about two-thirds the size of the above, with relatively shorter wings. It is grayish above and white beneath, and is confined to the western and northeastern parts of the continent.

The vulturine sea eagle (*Gypohierax angolensis*) brings us to a group of four genera which, while agreeing with the preceding in the shortness of the bare portion of the metatarsus, differ in the absence of a flap of membrane to the nostrils, which have a clean, bony margin. In three of them the aperture of the nostril is oval, with its longer axis placed more or less nearly at right angles to that of the beak, but in *Haliastur* the aperture is circular. In all, the tails are rounded or slightly emarginate. It may be well to mention that *Haliastur* is represented by the common brahmamny or maroon-backed kite (*H. indus*), easily recognized by its white head, neck, throat, and breast, and the maroon chestnut of the rest of the plumage.

The vulturine sea eagle, which is the sole representative of its genus, differs from the other forms with oval nostrils by the naked space above the eye, and is conspicuous for its parti-colored plumage. It has a peculiarly vulture-like appearance, and may be compared in size to the kite, the total length of the male being twenty-three inches, while the female is one and one-half inches longer. The beak and head are elongated and the wings very long and pointed, while the short tail is very markedly rounded. In the adult bird the color of the plumage, with the exception of the ends of the primary quills, the secondaries, most of the scapulars, and the tail feathers (save their tips), which are black, is pure white. The cere is gray, the bare skin of the face flesh colored, the iris light yellow, and the foot rosy flesh colored. The feathers of the hinder part of the head are somewhat elongated, so as to form a slight crest. In the young the whole plumage is dark brown and the iris also brown, the complete change to the adult dress not taking place till the third or fourth year. This bird is exclusively African, and is met with on the west

coast from Senegambia to Angola, and on the opposite side of the continent on Pemba island, near Zanzibar. Although so like a vulture in general appearance, in its habits it much more resembles the sea eagles. According to Reichenow, the vulturine sea eagle is one of the commonest birds on the west coast. Essentially a fish eater, it frequents the sea coast and rivers, and is but rarely seen in the dry highlands of the interior. Its favorite haunts are the wide mangrove swamps bor-



VULTURINE SEA EAGLE.
(One-fifth natural size.)

dering the larger rivers, where it may always be met with in numbers, sometimes associating in pairs, and at other times singly. When seated, it may be easily mistaken for a vulture, but its flight, although slower, is more like that of a sea eagle. When fishing, it generally flies close to the surface of the water, returning as soon as it has captured a fish to the shore to devour its prey. In the breeding season these birds proceed higher up the rivers, where the trees are taller, and thus afford

better nesting places than the low mangroves. The number of eggs in a nest is usually only two.

Sea Eagles The noble birds known as sea eagles, which include the largest member of the whole family, differ from the preceding genus by the absence of a naked space above the eye, and are further characterized by the lanceolate feathers of the crown of the head, and by the wings reaching nearly or quite to the end of the tail. The beak is long and powerful, straight for some distance from the base, and then curving regularly downward in a deep hook. In the leg the metatarsus is feathered for nearly half its length, and the naked portion reticulated down to the toes, while the latter are scutellated above. The strong, curved claws are grooved beneath, that of the first toe being the largest of all. There are some eight species of sea eagles distributed over the whole world, with the exception of South America; and, as the habits of all are generally similar, it will be convenient to notice the species together, and then to consider their mode of life. It may be mentioned that they are often confounded with the true eagles, from which they may be distinguished at a glance by the naked lower half of the metatarsus and the scutellation of its front surface. The sea eagles may be divided into three groups, according to whether the tail in the adult is entirely white, black with a white band at the end, or white with a terminal band of black. In the former group the white-tailed or gray sea eagle (*Haliaeetus albicilla*) is noteworthy as being the only species met with in the British Isles. In addition to the characteristic from which it takes its name, it is distinguished by the brown abdomen, the brownish wing coverts, and the ashy-brown hue of the head and neck, which are lighter than the back. The female attains a length of thirty-eight inches, the male being about four and one-half inches less. This species ranges across Europe and Northern Asia from Ireland to Japan, and also occurs in Southern Greenland, while it extends southward to Northwestern India. Its distribution includes the whole of Europe, but it has now become extremely rare in the British Islands, although still breeding in the Hebrides. The largest of all eagles are the giant or Steller's sea eagle (*H. pelagicus*), and the allied Corean sea eagle (*H. branicki*), the former attaining a length of forty-one inches. Steller's sea eagle, which is confined to the north-eastern regions of the Old World, inhabiting Northeastern Siberia, North China, Japan, and Kamchatka, is distinguished by its pure white wing coverts, thighs, and upper and lower tail coverts, and is further characterized by its highly wedge-shaped tail, which has fourteen feathers in place of the usual twelve. In young birds the wing coverts and thighs are, however, brownish, although in this state the species can be distinguished from the white-tailed sea eagle by the head and neck being of the same dark hue as the back. The Corean species is a uniform slaty-black color, without the white shoulder patches, thighs, and tail coverts. In correspondence with their giant size, the cry of both these species is much louder and more penetrating than that of all the other eagles. It is remarkable that a leg bone, apparently referable to Steller's sea eagle, has been obtained from the superficial deposits of Walthamstow in Essex. The white-headed sea eagle, or bald eagle (*H. leucocephalus*), the national emblem of the United States, differs from the white-tailed species, by having the whole of the head and neck pure white; the rest of the plum-



age of the upper parts being dark brown, approaching black, while beneath the color is a lighter brown. The length of the female is thirty-eight inches. This bird ranges over the whole of North America, extending southward to Florida, California, and Mexico. The species known as Pallas's sea eagle (*H. leucophæus*) differs from all the preceding by having the tail of the adult white with a broad band of black at the end; the remainder of the plumage, except the sides of the face,



WHITE-HEADED SEA EAGLE.
(One-sixth natural size.)

which are buffish white, being various shades of brown. This species is smaller than the foregoing, measuring only thirty inches in length. Typically an inhabitant of the Caspian region, it ranges eastward to India and Burma. The white-bellied sea eagle (*H. leucogaster*) is still smaller than the last, its length not exceeding twenty-eight inches. It differs from all the others by the tail being black with a broad terminal band of white, and is further characterized by the white head,

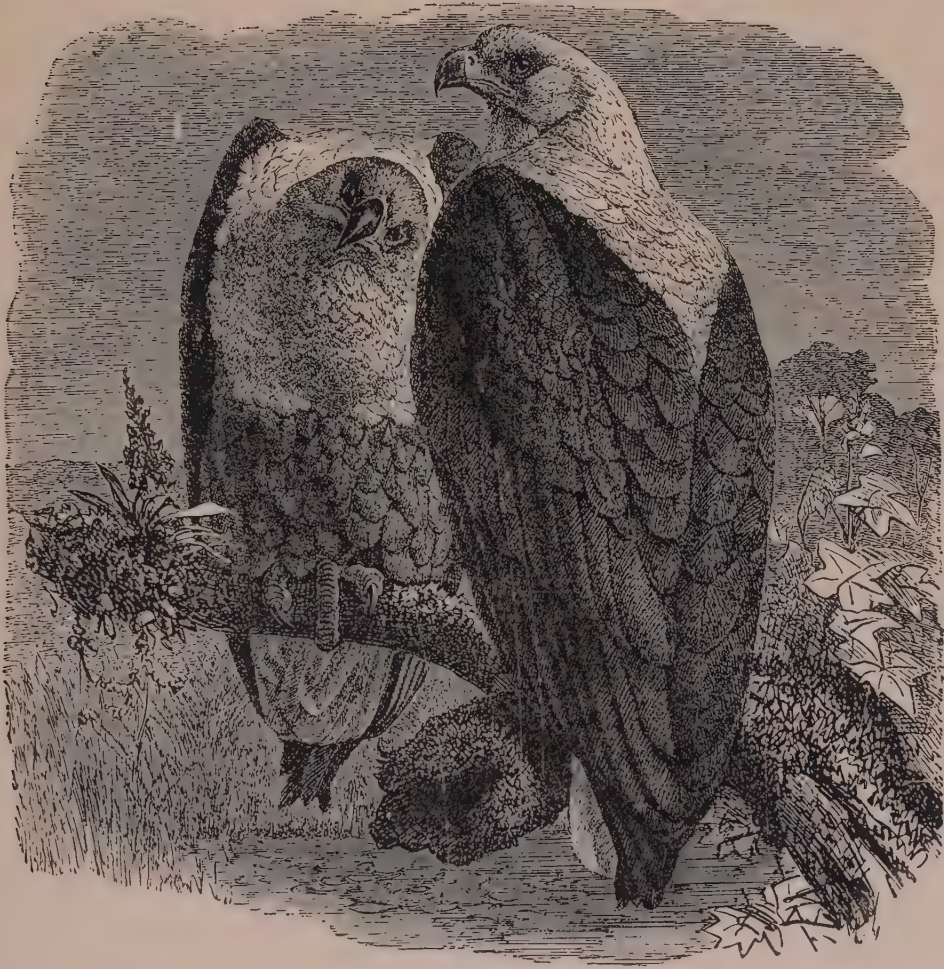
neck, and under parts, the general tint of the upper surface being gray slightly shaded with brown. This eagle extends from India and Ceylon through the Malayan region to Australia. The handsomest of the whole group is the African sea eagle (*H. vocifer*), which is smaller than all the northern species, attaining a length of only twenty-five inches in the female. Resembling the white-headed sea eagle, in its white head, neck, and tail, this species, which is figured on p. 1970, is distinguished by the white area extending on to the interscapular region above and including the breast below, and by the whole of the abdomen, together with the axillaries, being of a deep chestnut hue, while the upper parts are blackish brown, passing into black on the primary quills. The species is confined to Africa, where it ranges over the whole continent. It is replaced in Madagascar by the Madagascar sea eagle (*H. vociferoides*), distinguished by the white being confined to the head and neck, the brown under parts, and the chestnut under wing coverts; the latter characteristic distinguishing it from the larger white-headed sea eagle, in which these coverts are brown. An extinct sea eagle occurs in the Miocene deposits of France.

Although several of the species are more commonly found in the neighborhood of the coasts, sea eagles are also met with in the interior of the various continents and islands in the neighborhood of the larger rivers and lakes. Writing of the white-tailed sea eagle, Mr. Seeböhm observes that "the haunts of this noble-looking bird are the barren hills of the Hebrides and the adjacent isles, and the wild mountain country of the mainland in the west. On the bold and rocky headlands of this wild, rugged coast, whose hoary peaks are washed by the treacherous waters of the Minch, the sea eagle finds a congenial home. In Pomerania, especially between Stettin and the Baltic, the sea eagle is a common resident, building in forests. It builds an enormous nest, sometimes six or eight feet in diameter, near the top of a pine, or on the horizontal branch of an oak or beech, preferring forests near inland seas and large lakes. Instances have been known of its breeding in the same 'horst' for twenty years in succession. Every year some addition is made to the nest, until it becomes some five or six feet high. Occasionally a pair of sea eagles have two 'horsts' which are used alternately. They are shy birds and leave the nest at the least alarm, but do not easily forsake their old home. If the eggs are taken early in the season, the birds will frequently lay again in the same nest. They make a very flat nest, and generally line it on the top with moss. The male and female are said to sit alternately, and the female is said to be shyer than the male at the nest. Two is the usual number of eggs, but frequently only one is found; in rare cases as many as three are laid. Eggs may be taken from the first week in March to the middle of April." The nest may be situated either on rocks, in trees, or on the ground. In some countries the cliffs on which it is built are of comparatively easy access; but at the present day in the Hebrides and formerly on the west coast of Ireland, these birds build on ledges of the most stupendous cliffs, where their eyries can only be approached by the aid of a rope lowered from above. Many anecdotes record the boldness of the Irish peasants in thus attacking the strongholds of both golden and sea eagles. The food of the white-tailed sea eagle, like that of its allies, consists chiefly of fish and water fowl; although these birds

will at times not disdain a meal of carrion, while they probably carry off an occasional lamb or kid. It is related that an instance has occurred of a sea eagle, when attempting to carry off a large salmon, into which it had firmly fixed its talons, being partially dragged under water by its prey, both bird and fish being ultimately secured by a peasant who had witnessed the scene. In India, Pallas's sea eagle, according to Mr. Hume, always builds in trees, its nest being very similar to that of the last species, and the eggs laid from November to January. The nest may be occupied for several years, but the construction of a new one demands immense labor on the part of the birds. "I once," writes Mr. Hume, "watched a young pair constantly occupied for a full month, building a new nest, which they were still at work finishing off when I left. Nothing can seem rougher or more rugged than their nest when finished, and yet out of every four sticks and branches that they brought, they rejected and threw down at least three. Both birds brought materials, and side by side the pair would work away, throwing down almost as many sticks as they brought; then apparently they would quarrel over the matter; there would be a great squealing, and one would fly away and sit sulky on some cliff point near at hand; after a time the one left on the nest would go off in quest of materials. Immediately the other would drop softly onto the nest and be very busy till the absent bird returned, not unfrequently with a fish instead of a stick. It is a curious fact, that if the female, which is much the larger, brought the fish to the nest, the male set to work on it at once, without so much as 'by your leave'; while if the male brought it, the female used to eye it, sidle gradually up, and only take slow and modest mouthfuls. When, however, the female begins to sit, the male will bring her fish or fowl, and go off for other food for himself, not attempting to share it with her; and, when not on the nest, neither seems to presume with the other's capture without permission." The eggs, like those of the other species, are uniformly colored, being in this case of a pale grayish white; their usual number is three. Like the white-tailed sea eagle, this species will often lay again when its nest is robbed; but, according to Captain Bendire, this is never the case with the American white-headed species. All are agreed that so long as there are merely eggs in the nest Pallas's sea eagle never makes any attempt at defending its home; and, according to the extensive experience of Mr. Hume, the same is the case after the young are hatched. Hutton relates, however, that a native whom he had sent up a tree to deposit a nest, was once fiercely attacked, at first by the female, and then by both birds in concert; and that it was necessary to disable the eagles by shooting, in order to prevent the man being hurled from the tree.

Continuing his account of its habits, Mr. Hume states that Pallas's sea eagle is never found far away from rivers, lakes, or swamps. "Early in the morning, even in the cold weather, it goes down to the water side, and has a good bath. It is amusing to watch this large bird standing up to its belly in water, sitting down, first on one side, then on the other, so as to wash the wings and back, ducking the head in and out, and splashing, spluttering, and fluttering the wings for all the world like a pigeon or sparrow. After its bath, it resorts to the top of some tree, or, along the banks of large rivers, to some craggy point, where it sits for a while sunning itself, generally with its wings half outspread. Thence it flies off heavily

to seek a meal. A large fish near the surface attracts its attention, as it flies pretty low over the river, down it swoops with more activity and rapidity than its habitual demeanor and method of flight would lead one to expect, and strikes for a breakfast, dashing its huge feet and long legs into the water right up to the body." This action shows how adapted is the conformation of the bird to its mode of life, as heavily-feathered legs like those of the true eagles would become heavy



AFRICAN SEA EAGLE.
(One-fifth natural size.)

and bedraggled with water. The food of those birds is, however, by no means confined to fish; and they may frequently be seen on the larger Indian rivers hawking for ducks, teal, and paddy birds, while Mr. Hume states that they will pursue and carry off such a large animal as a wounded, wild goose, of which the weight may be as much as seven pounds. Hutton, too, writes that he has often watched one of these birds sitting on some dead tree on the river bank itself,

suddenly utter its shrill, clamorous, half croak-like, half scream-like cry, spread out its wings, and sweep across the water in search of winged game on the plains. Rising at first in wide circles, until nearly lost to view, it would gradually descend in similar gyrations, until with a sudden swoop it would dart upon some unfortunate partridge or hare, and bear it off in its talons.

The American white-headed sea eagle ranges from the frozen regions of Alaska and the Aleutian islands to the torrid plains of Mexico, although it is only a summer visitant to the more northern portions of its habitat. The nests appear to be similar to those of the European species, and but rarely contain more than a single pair of eggs. Usually situated in tall pines, at a height varying from twenty to one hundred feet above the ground, they may occasionally be found on the ground itself. Captain Bendire states that this bird subsists more on winged game captured by its own exertions than on fish, and that the accusation of its gaining its subsistence mainly by robbing the osprey is unfounded. Still, however, like others of its genus, there is no doubt that it does at times obtain a meal in this comparatively easy manner, and in some cases it has to depend entirely on fish for its food supply. A correspondent writes to the author just referred to, that on one occasion he noticed one of these sea eagles hovering over the sea in a manner very similar to that of the osprey when about to strike a fish. "Suddenly he plunged down and grappled with what I supposed to be a large fish, but was unable to rise with it from the water, and after struggling a while he lay with wings extended and apparently exhausted. After resting a minute or two, he again raised himself out of the water, and I saw he had some large black object in the grasp of one of his talons, which he succeeded in towing along the top of the water toward the shore, a short distance, and then letting go his hold. He was then joined by two other eagles, and by taking turns they soon succeeded in getting it to the shore." The booty was a large cormorant, upon which the eagles were about to feast. It is a remarkable fact, that of the two eggs usually laid by this species, one is always superior in size to the other, the difference between the two in this respect being sometimes very great. Steller's sea eagle subsists on young seals, Arctic hares, and foxes, and ptarmigan, but it will also eat dead fish and the carcasses of mammals.

**Bateleur
Eagle** An inhabitant of the whole of Africa lying to the south of the Sahara desert, the handsomely-colored bird known as the bateleur eagle (*Helotarsus ecaudatus*) differs from the sea eagles, and indeed from all other members of the family, by the extreme shortness of its tail, that appendage being far inferior in length to the wings. A further point of distinction is to be found in the feathers of the head, which are elongated so as to form a voluminous crest. As regards coloration, this bird is perhaps the most striking of all the eagles, presenting bold contrasts of maroon, black, and gray, which give to the entire plumage a most pleasing effect. The head, neck, and under parts are of a deep glossy black, the same hue also obtaining on the scapulars; contrasted with which is the chestnut maroon of the hinder part of the neck and the greater part of the back. The wing coverts are brown with a bronzy sheen; the primary quills blackish, externally shaded with gray; while the secondaries are mostly gray with

white tips, although the innermost have the sooty hue of the scapulars. The tail, with its inferior coverts, is chestnut maroon, like the back; the under surface of the wings being mainly gray and white. The cere and naked skin in front of the eyes, together with the feet, are of a deep coral red, while the iris is brown, and the beak black. Such are the striking colors of the ordinary form of the bateleur eagle, although individuals have been obtained in which the chestnut maroon of the back is replaced by creamy fulvous. Such birds have been regarded as representing a



BATELEUR EAGLE.
(One-fifth natural size.)

distinct species, but it is suggested by Dr. Sharpe that they may prove to be the fully adult condition of the ordinary form. The females attain a length of twenty-five, and the males of about twenty-one inches. Visitors to the eagle house in the Zoological Society's Gardens in Regent's Park may perhaps think that we have exaggerated the color of the cere and face in the bateleur eagle, as they will find these in the captive birds of a pale orange-yellow tint. This fading is, however,

solely due to the effects of captivity, the same change showing itself in captive specimens of the Accipitrines known as caracaras. The bateleur eagle is a common bird in many parts of Africa, preferring mountains to plains, and generally frequenting open districts rather than forests. In Abyssinia, where it is by no means abundant, it has been obtained from considerable elevations in the mountains. Mr. Blanford describes them "as soaring at a great height, their pointed wings and extremely short tail rendering them no less conspicuous than the contrast between the white under side of the wings and the black body. The flight is superb, more like that of a vulture than of an eagle, as the bird sweeps along with motionless wings, occasionally high up in the air, but more frequently at about one hundred and fifty to two hundred feet above the ground." Awakening with the first streaks of dawn, it leaves the trees on which it has roosted during the night in search of food, and after hunting for some hours seeks a resting place in which to pass the hottest portion of the day, issuing forth again to hunt in the evening. Levaillant states that these eagles prey upon young antelopes, lambs, and sick sheep, and that they will also eat carrion, while Heuglin mentions them as feeding largely upon the smaller mammals. Their chief food consists, however, of various snakes and lizards, of which they are said to consume a larger amount than the secretary vulture. Snakes of all sizes, whether venomous or harmless, are attacked by the bateleur, and speedily disabled by rapid blows from its powerful beak. At such times as the grass jungles are on fire, the bateleur, like the other serpent-eating birds of Central Africa, beats along the line of flame in order to seize the snakes and other reptiles, as they creep out, sometimes dashing into the very thick of the smoke to secure its prey. The nest of these birds is usually built in a tall tree, and frequently in those whose boughs are thickly beset with thorns. It contains from two to four white eggs. The breeding season takes place at the commencement of the hot weather, when the snakes are more easily captured than when the grass is long and rank.

Harrier Eagles The remaining members of the Aquiline subfamily in which the metatarsus is partially bare have the naked portion longer than in the preceding group, and either equal in length to, or longer than the third toe, exclusive of the claw. Of the several genera thus characterized, the buzzard eagles (*Buteo*), which ranges from India, China, and Japan through the Malayan region to New Guinea, and also occur in Northeastern Africa, differ from the rest in having the oval nostrils provided with a membrane above, the others having a clean bony margin to these organs. Omitting mention of three unimportant genera, severally represented by a single species, we find the harrier eagles characterized by the nostrils taking the form of transverse ovals, by the feathers of the small crest being of a lance-like shape, and by the elongation of the wing. The long tail is nearly even, the metatarsus long and reticulate, and the short beak somewhat compressed and deeply hooked at the extremity, while the toes are very short. Most of the few species of this genus are confined to Africa, but the common harrier eagle (*Circus*) has a much wider distribution, ranging from the countries bordering the Mediterranean to India, and the small islands of Timor and Flores, and being sometimes found in Central Europe. They are usually met with in open plains, living much on the wing, and feeding chiefly on snakes and other reptiles, and in appear-

ance and habits resembling the buzzards, with which they are connected by the afore-mentioned buzzard eagles. The common harrier eagle, represented in the illustration on this page, is one of the smaller members of the group, the females measuring twenty-six inches, against thirty-two in the largest African species. It is thus rather larger than a kite. The general color of the adult bird is dark brown, with a purplish gloss above, and the head tending to ashy brown, the quills being dusky



COMMON HARRIER EAGLE.
(One-fourth natural size.)

black. The tail is pale ashy brown, with a white tip, and three dusky transverse bars. Beneath, the color is white, the throat narrowly streaked with brown, and with a black shaft stripe to each feather, while the flanks are banded with widely separated dark bars. The iris is orange yellow, the cere whitish, the bill horn colored at the tip and gray at the base, and the feet pale grayish brown. Jerdon writes that in India this harrier eagle is spread over all the more open parts of the country,

generally avoiding thick jungle and forest. "It may often be seen sitting on a low tree, when it occasionally darts on its quarry, but it generally circles in the air, taking a long and lofty flight, now and then flying heavily along the ground like a harrier. I have frequently seen it hover in the air like a kestrel, and drop down on its prey, like a stone, afterward. It is a rather noisy bird, frequently uttering a wild plaintive scream. I have seen several together occasionally, but it is usually solitary. Its chief food is snakes and lizards, but it will eat anything,—rats, weakly birds, crabs, frogs, centipedes, and large insects. I have seen one strike at a wounded hare, and it will occasionally carry off a wounded teal or duck." According to Mr. Hume, by whom this species is termed the short-toed eagle, it nests in Upper India from January to March, nearly always building in trees, and laying one or two eggs of a pale bluish-white color. The nest, which is formed of sticks, and from two to three feet in diameter by from six inches to a foot in depth, may be almost entirely devoid of lining, or so thickly coated with grass or straw that the eggs look as though packed in a basket for traveling. This eagle is comparatively rarely met with in the south of France, where it is known as Jean-le-Blanc, but is more common in Palestine, where its nesting habits have been described by Canon Tristram. Nests have been taken in France in the middle of May.

Serpent
Eagles

Although the term serpent eagle is not unfrequently applied to the members of the preceding genus, as a matter of convenience it is far preferable to restrict it to the nearly allied species coming under the generic title of *Spilornis*. These birds are distinguished from the harrier eagles by the feathers of the crest being of greater length, and rounded, instead of lanceolate, at the tip, and also by the shorter wing. The genus is mainly characteristic of India and the Malayan region, although also represented in the Philippines, the south of China, and Formosa. In habits these birds are more arboreal, and far less constantly on the wing than the harrier eagles, darting on the snakes and other reptiles, which form their food, from the boughs of trees. The serpent eagles derive their scientific name from the white or pale spots which ornament the dark colored plumage of all the species save one, and the name of spotted eagles would have been exceeding appropriate had it not been already employed in another sense. The Indian serpent eagle (*S. chila*) is by far the largest member of the genus, the female measuring thirty inches in length, and is a decidedly handsome bird. The head is black, with conspicuous white bases to the long feathers of the crest; above and below, the general color is brown, with small spots on the scapulars and wing coverts, and larger ones on the hinder part of the lower surface, the chest being uniform. The quills have some dusky markings, and the tail is mottled with white, and crossed with three bars of darker brown. Two other species share in this general type of coloration; but in another pair the chest is rufous, one of them (*S. sulaensis*) having the abdomen banded instead of spotted with white, while in the sixth (*S. holospilus*), from the Philippines, the entire body is spotted. The Indian serpent eagle ranges from India to China and Formosa; and in the former country is most common in jungly districts, although also found in wooded places. In addition to reptiles, it eats large insects and frogs, catching the latter in tanks. It nests in trees, laying two white eggs marked with a few dark specks.

African
Crested
Eagle

The handsome bird represented in the illustration below, and known as the African crested eagle (*Lophoaëtus occipitalis*), is the sole representative of a genus which brings us to the last group of the *Aquilinæ*, the members of that group differing from all the preceding forms by the metatarsi being completely feathered throughout their length.



AFRICAN CRESTED EAGLE.
(One-third natural size.)

The African crested eagle belongs to a group of several genera characterized by the tail being nearly square, or slightly rounded, while it is distinguished from all the others, with the exception of the true crested eagles, by the length of the interval between the tips of the primaries and secondaries of the wings being inferior to that of the metatarsus. The great size and pendent characteristic of the crest of the

present bird at once serves to mark its distinctness from the members of the next genus. The nostrils are circular, the beak short, and the metatarsi of considerable length, with short feathers. In point of size the African crested eagle is somewhat inferior to the red kite, the total length of the female being twenty-one inches. The general color of the plumage is chocolate brown, with some of the feathers on the back and wing coverts paler and the head darker, with a black crest. The forehead and legs are whitish, and there are a few white spots on the upper tail coverts, while the under wing coverts are also mostly white. The tail has dark bars. The bill is bluish with a black tip, the cere and feet are yellow, and the claws black. This eagle is one of the most widely distributed of African Accipitrines, ranging all over that continent, from the Cape to the Red Sea, wherever there are wooded districts. It frequents mountains and plains alike, and is even represented in such of the open regions as have patches of mimosa-jungle, more especially on the river banks. In the wooded parts of the upper Nile it is especially common, where it may be seen sitting placidly among the branches of a mimosa, not far removed from the main stem. From this coign of vantage it watches for its prey, swooping down like lightning upon any mouse, rat, ground squirrel, or dove, or other small bird that may come within its range. In its general habits it is very similar to the crested eagles, and, for its size, is one of the most powerful and active of the Accipitrines. In addition to small mammals and birds, it consumes numbers of lizards and snakes, and also eats fish and frogs, while, when hard pressed, it will resort to carrion. It has been seen perched on a branch in the neighborhood of a slaughterhouse, watching its opportunity to feast on the offal or to seize a bone. Little is known of its breeding habits, although it is said to nest in trees, and lay two nearly round eggs, of a pale ground color blotched with reddish brown.

Crested Eagles There is a difference of opinion among ornithologists as to the best English name to be applied to the members of the present genus, some terming them hawk eagles, while by others they are designated crested eagles. In the British Museum the latter designation is adopted, and the term hawk eagles applied to the members of the genus *Nisaëtus*, and it is this ruling which is followed here. These eagles are readily distinguished by the crest (occasionally absent) being very much smaller than in the African crested eagle, and by their shorter wings. The beak is short, sharply curved at the tip, and with a prominent festoon; the toes are large, and very unequal, and the claws strong and much curved. The genus is represented by a considerable number of species, and has a very wide geographical distribution. It is spread all over Africa, the Indian and Malayan regions, Celebes, Japan, and Formosa, and it is found in Central and South America, exclusive of the extreme south.

The species shown on the next page (*Spizaëtus bellicosus*) is from South Africa, and is one of the largest members of the genus, the total length of the female being thirty-one inches. It belongs to a group in which the chest is uniformly colored, and is distinguished from some of its allies by the barred tail. In the immature bird, of which our figure is an example, the general color of the upper parts is pale brown, with white margins to the feathers of the back; the feathers of the head and neck are white, with a terminal spot of brown; the greater and primary wing

coverts and quills are ashy brown, tipped with white, and barred with darker brown; and the tail feathers are likewise ashy brown, with buffish-white tips, and crossed with eleven dark brown bars. With the exception of a few dark brown spots on the chest and under wing coverts, the whole of the under parts are uniform buffish white. In the adult the general color becomes dark brown above, the head being dark brown, with narrow pale margins to the feathers; the tail has but six bars;



WARLIKE CRESTED EAGLE.
(One sixth natural size.)

and the front of the neck and chest are dark brown, the remainder of the under surface being white, with some dark spots. All the Oriental species are smaller, some having the inferior portion of the under surface marked with dark barrings.

The following account of the habits of the marsh crested eagle (*S. limnaëtus*), which ranges from India to Java, is given by Captain Fielden, who writes from Pegu. He observes that this eagle "seems to be a very common bird about Thy-

etmyo; every ravine in the spurs of the Arracan mountains seems to contain one or more pairs, as well as every wooded stream in the lower ground. Their wild screaming (whistle) is almost always to be heard long before the bird is seen, as it sits in some large tree rising above the rest of the jungle, or wheels in circles far overhead; it is one of the wildest and wariest of birds. One that I took from the nest nearly two years ago is still as wild as ever, and constantly ruffles up the feathers of its head till they look almost like the crest of a bloodsucker, leaving the top of the head almost bare. It has also a habit of throwing back the head, apparently looking for a hole in the top of its cage, and bending backward till it frequently falls over. These birds, as far as I know, feed on mynas, rats, and frogs. I have taken a young bird from the nest in the middle of May, and seen several young birds about the end of that month. They build the usual hawk eagle's nest in the fork of the largest and most inaccessible tree that they can find, invariably overhanging the bed of a stream. Either numbers of these birds build and do not lay, or else they desert their nests on the slightest suspicion of having been discovered. Several pairs of birds belonging to nests in more remote parts of the jungle seemed all to have succeeded in rearing one young each. The Burmese state that the birds lay only one egg, which is pure white. While the trees are in full leaf, these eagles shelter themselves in the middle of some thick tree during the heat of the day." A later observer in the same district, Mr. W. Davison, in commenting on this account, states that he found the crested eagles perfectly silent, and accordingly believes that the peculiar cry is uttered only during the breeding season.

Another Indian species, the changeable crested eagle (*S. caligatus*), is known in Garhwal as the peacock killer, and is said to destroy a large number of game birds. Mr. R. Thompson writes that he once saw one of these eagles "stoop at a peacock which was on the ground, and strike at his head. The peacock dodged, rose, and flew into a patch of tall grass, where he lay concealed. The eagle took himself to a tree close by, whence he quietly watched the movements of the other. After a while, the peacock began to move from his place of concealment; the moment he was well out of the grass, the eagle darted down and caught him by the neck. When I got up to the place, having been a witness to the whole proceeding, the eagle left his quarry and flew up into a tree; the peacock was quite dead. I have often put up black partridge for these birds, and have had much sport watching them flying after the game. These birds are first rate at jungle fowl in the wild state. I have caught several and tried to tame them; but all my falconers either refused to keep them, or destroyed them shortly after they were put in their possession. A small chicken, or in its place a grown-up hen or cock, is a capital bait for catching this bird. The net used is a vertical one, about eight feet square, with large and stout meshes. The eagle dashes into this like fury, and is always caught."

Omitting mention of a few comparatively unimportant genera, we
Hawk Eagles come to the consideration of those species to which, as we have seen, it is convenient to restrict the name of hawk eagles. Together with the true eagles, the hawk eagles may be distinguished from the foregoing genera with feathered metatarsi by the interval between the tips of the primary and secondary

quills being less than the length of the metatarsus; and they are further characterized by the absence of a crest. The hawk eagles have the metatarsus of considerable length, but of no great thickness, and their wings are as a rule proportionately shorter than in the true eagles; while there are generally more large scales on the upper surface of the toes than in the latter. The most sure way of distinguishing between the two genera, according to Dr. Sharpe, is by comparing the length



BONELLI'S HAWK EAGLE.
(One-sixth natural size.)

of the fourth toe, measured from the commencement of the metatarsal feathers, and exclusive of the claw, with the circumference of the beak in front of the cere; when it will be found that whereas in the hawk eagles the two diameters are equal, in the true eagles the former is less than the latter. The range of the hawk eagles includes Africa, the north coast of the Mediterranean, India, Ceylon, and Australia. Among the small number of species constituting this genus, the

best known is Bonelli's hawk eagle (*Nisaëtus fasciatus*), which is at the same time one of the largest, the female measuring twenty-six inches in length, and thus being somewhat more than two-thirds the size of the golden eagle. In general color the adult bird (shown in the lower figure of our illustration) is dark brown above, with some white about the head and in the region of the neck; the quills are deep brown, with white mottlings on their inner webs, and the tail is ashy brown, with a broad terminal band of dark brown, and several incomplete bars of the same tint higher up. The axillaries are white, streaked with black, and the under parts are white, with dark shaft stripes of variable breadth to the feathers, passing on the flanks into arrowhead-like markings. The beak is black, with a lighter base; the iris yellow, the cere dull yellow, and the foot whitish yellow. In the young bird, as shown in the upper figure of our engraving, the general color of the upper parts is brown, and that of the head, neck, and under parts fawn, with distinct black shaft stripes to all the feathers. The range of this fine eagle includes the regions lying on both sides of the Mediterranean, from whence it extends eastward through Palestine and Syria to Arabia. In India, where it is termed "mohrangi" (*i. e.*, peacock killer), it is generally only seen in hilly or jungly districts, although it occasionally resorts to neighboring cultivated ground. It is common in the Nilgiri hills of Madras, where its nests are often placed on such precipitous cliffs as to be accessible only with the aid of a rope. Passing much of its time on the wing, and invariably visiting certain spots within its beat at almost the same hour day by day, this eagle may be seen when in repose perched either on the summit of some tall tree, or on some rocky prominence. Its prey consists of various game birds, ducks, herons, and other waterfowl, as well as hares and small mammals; and it is said at times to carry off trained falcons that are employed in hawking. It also occasionally kills peafowl, and is a great marauder in poultry yards and dove cots. Jerdon says, in reference to its pigeon-killing habits: "On the pigeons taking flight, one of the eagles pounced down from a vast height on the flock, but directing its swoop rather under the pigeons than directly at them. Its mate, watching the moment when, alarmed by the first swoop, the pigeons rose in confusion, pounced unerringly on one of them and carried it off; and the other eagle, having risen again, also made another, and, this time, a fatal swoop." Nesting in the Nilgiris and Himalayas on rocky cliffs, in the plains of India Bonelli's eagle more generally selects the tall clay banks of the larger rivers on which to build, although instances are known of the nest being placed in trees. In the plains of India the breeding season is in December and January, but is delayed in the Himalayas till April and May. The nest is four to six feet in diameter, and varies in height from a few inches to a couple of feet, its summit being always finished off level, with scarcely any central hollow. The eggs, two in number, are oval in shape, and frequently unspotted, while they are at most but faintly blotched with pale yellowish or reddish brown upon a grayish ground. Bonelli's eagle is a common bird in Spain, and a pair breed regularly upon the rock of Gibraltar. It is likewise fairly abundant in Palestine.

The booted, or dwarf hawk eagle (*N. pennatus*) is a far smaller bird than the last, and may be compared in size to a kite, the total length of the female being

**Booted Hawk
Eagle**

only twenty-four inches. It may be easily recognized by the conspicuous white patch on the shoulder. In the greater relative length of the wing, and the generally brown color of the iris, it differs from the two more typical members of the genus, and approaches the true eagles, although it has the characteristic long legs of the present group. This bird is subject to great variation with regard to the color of the plumage of the under parts; a difference



BOOTED HAWK EAGLE.
(One-fourth natural size.)

which was long considered to be due to age, and has given rise to much discussion. Dr. Sharpe, for instance, considered that the dark colored variety represented on the left in our illustration was the immature dress, while the light individual on the right was an individual in the adult plumage. Dr. Scully, writing from observations made in Gilgit, states, however, that in that district "the dark and light forms are about equally common, the difference in color not being dependent

upon sex." And he adds that he captured a nestling with white under parts, thus effectually disposing of the theory that the dark form was the young. In the light variety the general color of the upper parts is brown, with a tinge of purple on the scapulars, and the above-mentioned distinct white patch on the uppermost feathers of that series. The lowest scapulars and wing coverts have buffish-white borders; while the quills are blackish, the secondaries having light borders. The head and neck are fawn color, with streaks of dark brown; the sides of the face being streaked with blackish, and the frontal feathers nearly white. A slight lengthening of the feathers at the back of the head gives rise to an incipient crest. The brown tail is tipped with dull white and marked with several indistinct darker bars. On the under parts the ground color is buffish white, with a tinge of fawn on the throat and chest, upon which are a number of dark streaks, which disappear on the abdomen and thighs. The beak is bluish black, with a pale blue base, and the cere and feet are yellow. In the dark variety, the plumage differs from that of the adult by the brown color of the under parts, where the feathers have black shaft lines. The booted eagle inhabits all the countries bordering the Mediterranean, extending into Southern Africa and Southeastern Europe, and also occurring in Gilgit, India, and Ceylon. It is represented in Australia by the nearly-allied *S. morphnoides*. In India the species under consideration frequents groves, gardens, and cultivated lands, and in the neighborhood of towns and villages inflicts serious loss on the owners of pigeons and poultry. Jerdon says that this eagle generally swoops down on its prey—which includes small mammals—while circling in the air, but that it will occasionally pounce down from a bough. It breeds in Spain and other parts of Southern Europe, as well as in India and Africa, the nest being apparently always situated in a tree. Writing of the nests observed by him in Spain, Lord Lilford states that they always contained two eggs, this seeming to be invariably the number laid by this eagle. In Spain the booted eagle is one of the most common Accipitrines, arriving late in April and remaining till October. "The nests," continues Lord Lilford, "of which we found several, were generally placed on the lowest branches of a tall pine, at the junction of the main trunk, and were built of sticks, but inside invariably contained fresh twigs with the green leaves adhering to them." The breeding season in Spain lasts from April till June, and the oval eggs have grayish or dead white grounds, which may or may not be blotched with pale yellowish or reddish brown. The booted eagle is remarkable for its shrill piercing scream, which is stated both by Lord Lilford and Mr. Hume to be unlike the cry of any other Accipitrine. In Gilgit, this eagle is found from March till October, and it breeds there at an elevation of five thousand feet.

True Eagles The characteristics by which the true eagles may be distinguished from the hawk eagles having been already indicated under the heading of the latter, it will suffice here to refer to some of the leading features of the present group. The true eagles are all birds of large size, and, with the exception of Steller's sea eagle, include the largest representatives of the whole family. In all of them the beak is strong and of moderate length, curving gradually from the cere, with a sharp point and nearly straight cutting edges; while the nostrils may be either oval and oblique or circular. The wings are large and long, and have

the fourth quill rather the longest. The feathered metatarsus is of moderate length; and its reticulated scales extend far on to the toes, which have only a few large scutes near the claws, these features at once serving to distinguish the limb of one of these birds from that of a sea eagle. The claws are of moderate size and curvature. They are mostly birds of plain and dark colored plumage, with the iris of the eye some tinge of brown. Inferior in courage to the falcons, the eagles are much superior in this respect to the kites and buzzards; and, while the majority kill their own prey, few will refuse to eat the carcasses of such animals as they may find dead, and some feed greedily on carrion. The range of the genus includes the whole of Europe and Africa, and the greater part of Asia, but stops short of the Malayan region and does not extend to Australia. In America eagles are found as far south as Mexico.



THE FEATHERED METATARSUS OF THE
GOLDEN EAGLE.

From its large size and magnificent appearance, the golden eagle **Golden Eagle** (*Aquila chrysaetus*) has by almost universal assent been regarded as the "king of birds," although the tendency of modern writers has been rather to detract from the boldness and fierceness of its character, and one at least has even gone so far as to suggest the accusation of downright cowardice. All, however, who have enjoyed (as the writer has) the opportunity of seeing the flight of this splendid bird, are in full accord as to its power and majestic character.

The female of the golden eagle usually attains a length of thirty-five and one-half inches, while the male is some three inches less. In the fully adult bird, the pointed feathers covering the head and neck are rufous brown, tending to tawny on the back of the neck; while the general color of the plumage of the upper parts is blackish brown, with light margins to the feathers of the middle of the back and the wing coverts. The primary quills are nearly black; the feathers of the abdomen, thighs, and legs pale brown, and the remainder of the under parts blackish brown. The tail is blackish at the tip and browner toward the root, where it is mottled with ashy gray, while it is crossed near the middle with one or two grayish bands. The beak is bluish-horn color, darkening at the tip; the cere yellow; the iris hazel; while the feet are yellow, with black claws. In young birds, as shown in the cut on next page, the whole of the root of the tail is whitish or pure white, becoming gradually mottled with gray and brown toward the middle, and only the terminal third of the feathers is nearly black. The feathers on the back of the neck are thus generally less rufous, the general color of the plumage of the body and wings is darker and more uniform, and the primary quills, save the

first three, have much white at their roots. In this state the bird is termed a "ring-tail." There is, however, a great amount of individual variation in the coloring of golden eagles. For instance, some old birds are almost uniformly dark brown, and others golden brown, while in some the upper parts are blackish, and the lower surface golden brown. In others again, the white at the base of the primary quills is retained, and in some cases the quills are banded. Very rarely white individuals have been observed. In the Old World the range of the golden eagle embraces the whole of Europe and Northern Asia, extending southward into Northern China and the Himalayas, while a few individuals straggle into Peninsular India. The bird is common in Palestine during the winter, and is more rarely met with in Arabia, Egypt, and Abyssinia, while it breeds in Algeria. It is now defi-



GOLDEN EAGLE'S EYRIE.

nitely settled that the so-called Canadian eagle of North America is identical with the Old-World species; its range extending from Alaska to California and Mexico. The young of the American race are peculiarly light colored in the region of the head and neck, and many American specimens attain a very large size, even up to forty-one inches. Dr. Sharpe states, however, that nearly equally large examples have been obtained from Northern India. In the United Kingdom the golden eagle still holds its own to a limited extent in the Scottish islands, and probably also breeds in some of the wilder mountainous districts of Ireland.

Habits

Generally a rock-haunting and cleft-nesting bird, in many parts of Lapland, Siberia, and the North-American prairies, the golden eagle frequents more open districts, where it is compelled to nest either in trees or on the

steep clay banks of rivers and streams. Its powerful build and strong rapid flight render it more than a match for any animal of its size, and its food consequently comprises many of the larger kinds of game, as well as lambs. In Europe these eagles prey largely upon fawns, hares, rabbits, and the various kinds of feathered game, and are consequently formidable enemies to the game preserver. One has been known to carry off a wounded grouse from in front of the guns of the sports-



IMMATURE GOLDEN EAGLE.

men; while another is recorded to have picked up a hare running before hounds. In pursuing hares and rabbits, two eagles will at times combine their efforts in the chase. An Irish peasant reported to the author of *Wild Sports of the West*, that, in coursing hares, "one bird was the active follower, while another remained in reserve at a distance of forty or fifty yards. If the hare, by a sudden turn, freed herself from her most pressing enemy, the second bird instantly took up the chase,

and thus prevented the victim from having a moment's respite." That such a sporting bird can deign to feed on carrion, seems surprising; nevertheless the golden eagle will not only eat such garbage when pressed by hunger, but actually seems to prefer it; and it is owing to this unsavory taste that these birds are so easily approached and killed. In America the golden eagle preys on marmots, prairie marmots, wood rats, squirrels, and smaller rodents, as well as grouse, geese, ducks, and wading birds; while more rarely it seizes the fawns of the prongbuck and various deer, as well as lambs. A correspondent of Captain Bendire relates, on native authority, that a golden eagle once struck down and killed a full-grown black-tailed deer which had been badly wounded. In devouring their prey, these birds usually swallow the smaller mammals, hair and all, although birds are generally previously plucked.

In Northern Europe the golden eagle begins to breed in March or the early part of April, frequently while the ground is still covered with snow, and generally occupies the same eyrie for many successive years. The nest is of large size and composed of sticks, in the shape of a flattened platform, and lined with roots, dry grass, heather, moss, or fern, but never in the Old World with feathers. In Shetland, where sticks are scarce, the material may be long rope-like seaweed. It appears that although in rocky districts the nests are situated on ledges of cliffs or precipices, yet they are by no means always in inaccessible places. As the nest is repaired year after year, it eventually attains an enormous size if its owners are undisturbed. A correspondent writing to Captain Bendire from Colorado states that he has seen a nest over seven feet in height, and with a diameter of fully six feet, which he estimated to contain two cart loads of material. In that State the old nests are repaired as early as February; a bough of evergreen being invariably laid on each, as if to mark its being occupied. In California the nests are always in trees; and, although generally lined with vegetable substances, an instance has been observed where the lining was of feathers, evidently from the breast of one of the parents. One case is on record where a golden eagle built in Scotland in a tree. During the breeding season each pair of golden eagles usually has a definite region over which they hunt, and into which no others intrude. In Oregon the nests are stated to be at distances of as much as twenty miles apart, although in California from two to six miles is given as the width of the range of a pair of these birds. The eggs are usually two in number, but may be three, while four have been occasionally taken. Although fairly constant in size, they are subject to extreme variation in color; some being pure white, while others are more or less blotched with shades of red or purplish brown. In Scotland the eggs are commonly hatched in the latter part of April; the newly-born nestlings being clothed in pure white down, which, however, is soon replaced by the dark first plumage.

With regard to its courage, Captain Bendire writes that "notwithstanding the many sensational stories of the fierceness and prowess of the golden eagle, especially in the defense of its eyrie, from my own observations I must confess that, if not an arrant coward, it certainly is the most indifferent bird in respect to the care of its eggs and young I have ever seen. This may possibly be due more to utter

parental indifference than to actual cowardice, as three of these birds, an adult male caught in a trap, and a pair of young—male and female—taken from the nest when three years old and raised by me, did not seem to be deficient in spirit by any means, and were always ready to attack anything and everything on the slightest provocation.” In captivity the golden eagle is far more tractable than the sea eagles, and in Central Asia, where it is known as the birkut, or karakush, it is trained to kill mammals and large birds. Dr. Scully writes that the trained bird “is always kept hooded when it is indoors, except when about to be fed, and the method of carrying it in the chase is the following: The man who is to carry the eagle is mounted on a pony and has his right hand and wrist protected by a thick gauntlet. A crutch, consisting of a straight piece of stick carrying a curved crosspiece of horn or wood—the concavity being directed upward—is attached to the front of the saddle; the man grasps the crosspiece of the crutch with his gloved hand, and the eagle then perches on his wrist.”

Although frequently mistaken in the later stages of its immature plumage for the preceding species, the imperial eagle (*Aquila heliaca*) is really very distinct, and may be easily recognized in the adult state by the more or less conspicuous white patch on the scapulars. In size it is smaller than the golden eagle, with less difference between the two sexes; the length of the female of this species being the same as that of the male of the golden eagle (thirty-two inches), while that of the male is but an inch less. The body is stoutly built, the tail short, and the wings so long as to reach slightly beyond the extremity of the former. In the adult bird the general color of the plumage is blackish brown, becoming lighter on the back and tail coverts; the head and neck are light fulvous; the scapulars have the above-mentioned white patch, which is exclusively confined to that series of feathers, and the tail is ashy gray, marked with indistinct dark bars for the greater part of its extent, but its terminal portion blackish, with a narrow fulvous border. The young bird is rather light brown above, with the feathers tipped with buffish fawn, so as to give a spotted appearance to the plumage, and some of the wing coverts have whitish ends; the plumage of the under surface being tawny fulvous, with the breast feathers margined with brown, so as to look as though streaked. The tail is uniform brown, tipped with buffish white. In an intermediate stage the brown edgings of the breast feathers appear to extend to their centres, so that the whole plumage becomes brown; and it is when in this state that the bird is so often mistaken for the golden eagle. At all ages the cere and feet are pale yellow, while the beak is bluish, and the iris brownish yellow. The imperial eagle is mainly a southern form, occurring in South-eastern and rarely Central Europe, whence it ranges through Palestine and the adjacent countries to India and China. In Northern Africa it is replaced by Adalbert's eagle (*Aquila adalberti*), which also occurs in Spain, and differs by the white patch on the wing extending on to the carpal plumes. In the neighborhood of India the imperial eagle regularly breeds in the Himalayas, but the majority of the specimens seen in the plains of India are winter visitors although a few remain to nest in the Upper Punjab. In Southern India the species is rare, although it is not uncommon in the high table-lands of the Peninsula.

In India, according to Jerdon, this eagle "prefers the neighborhood of hills, and the bare open country, or thin and low jungle. It may frequently be seen seated on the ground, or on a stone on the top of a low hill, till an hour after sunrise, when it rises, apparently unwillingly, and takes a cast after game at no great elevation, hunting slowly over the bushy valleys and ravines, and occasionally over cultivated ground. If unsuccessful in its search, it reseats itself, and after an



IMPERIAL EAGLE.
(One-sixth natural size.)

interval again takes wing, and this time soars to a great height, circling slowly in the air, and transversing a large extent of country. It pounces on hares, florikins, rats, lizards, and various other rodents and birds, and in default of these will eat carrion. I have several times seen one captured in a net by a portion of a carcass of a sheep being put down as a bait. When it does condescend to partake of carrion, it allows no other bird to approach till it has satisfied its hunger."

In Palestine Canon Tristram writes that this truly imperial bird is more abundant than in any other country which he had visited, and may be said, in summer at least, to replace the golden eagle of Europe. "There is a beauty and majesty in its movements," the Canon continues, "and in its great fearlessness of man, when in search of food, which at once attracts one; while the very distinct white scapulars, and the light head, show conspicuously when on the wing. Unlike the golden eagle, it was as common at one time of the year as another, though we never took a nest." This account gives an idea that the imperial eagle is a noble and courageous bird endowed with considerable fierceness. The experience of Mr. Hume in India does not, however, countenance the attribute of these qualities; although it is suggested, perhaps humorously, that its deficiencies in these respects may be due to the enervating nature of the climate. Mr. Hume says that "I have driven the female off hard-set eggs, and plundered the nest before the eyes of the pair, without either flapping a pinion, even to defend what even a little shrike will swoop at once to save. I have seen a couple of crows thrash one of them soundly; and, whether it be that familiarity breeds contempt, I am bound to record, that after having seen many hundreds, and shot, I dare say, a good hundred myself, I look upon the *Königs-adler* as no better than a great hulking kite." Contrary to the opinion of Jerdon, the writer adds that in his experience this eagle is generally a foul feeder.

The nest appears to be always situated in a tree, and is of large size; one taken in a pollard tree on the Danube having a circumference of about fifteen feet, and being lined with wool. The eggs are very variable in size, and have a grayish-white ground, which is usually unspotted, but may be marked with pale brown, or more rarely with purplish brown. In the Punjab the usual laying time is February and March, but it may be prolonged for another month; the nest referred to above from the Danubian provinces was taken at the end of April.

Spotted Eagle The spotted eagle (*Aquila maculata*) of Central Europe, which is selected as an example of species much smaller than the golden eagle, of which it is only about one-third the size, is a bird which has received more than the usual liberal allowance of scientific names. The total length of the adult female is twenty-five inches, and that of the male only half an inch less. The general color of the adult bird is liver brown on the upper parts, with the head somewhat lighter, and its upper feathers lanceolate. The wing coverts are somewhat paler, with simple whity-brown margins; and the quills are blackish, shaded with ashy on the primaries, and browner on the secondaries. The tail feathers are lighter than the quills, with their inner webs bronzy, and the tips inclining to tawny; the under tail coverts being earthy brown with lighter tips, and the lower surface of the tail uniform brown. The beak is bluish horn color, the cere yellow, the iris hazel, and the toes yellow with black claws. In the young bird, as shown in the central figure of our illustration, the general color is a darker chocolate brown, the tips of the wing coverts, inner secondaries, upper tail coverts, and tail feathers being marked with somewhat crescentic spots of a pale wood brown; the cheeks and under surface pale brown, becoming lighter, with a tinge of tawny on the under tail coverts; some of the chest feathers are a rather darker brown with tawny-brown centres, and cer-

tain of the under wing coverts have light tips. It is of course only in the immature and intermediate stages of plumage that the name "spotted eagle" is strictly applicable to the bird.

The ordinary form of the spotted eagle inhabits Central Europe, ranging into Northern Germany, Pomerania, and Poland, and migrating during the winter into Egypt and other parts of Northern Africa. In Southern and Western Europe it is rare. Eastward it doubtless extends into Palestine, and it is represented in India



SPOTTED EAGLE.
(One-fifth natural size.)

by a variety distinguished by the general presence of small white spots on the lesser wing coverts. There is also a larger variety, or species, known as the larger spotted eagle (*Aquila clanga*), attaining a length of twenty-six and one-half inches in the female. This variety is characteristic of Southeastern Europe, being but seldom found in Poland, Pomerania, and Germany, and ranging eastward into Siberia. During their migrations specimens of the spotted eagle are occasionally blown on to

the English coasts, and an immature example in an exhausted 'condition was captured at Colchester in November, 1891. In general appearance the adult of this species is very similar to the golden eagle in miniature. It is especially abundant in Pomerania, and in Europe frequents wooded districts, sometimes building in low blackthorn bushes, or even on the ground itself. In India, according to Mr. Hume, this eagle is always found either in the neighborhood of swamps or where the country has been irrigated; and he refers to the sudden immigration of a number of these birds into a district where irrigation works had been recently opened. The same observer notes that this eagle generally sits in a slouching kite-like fashion across a branch, halfway up a tree; whereas, on the other hand, the imperial and tawny eagles generally sit bolt upright at the very top of a tree, and consequently cannot be seen by an observer immediately beneath. The spotted eagle commonly nests in trees.

Other Species Other species of the genus are the tawny eagle (*A. rapax*) of Africa, distinguished by the tawny hue of the immature plumage; the slightly smaller but closely-allied Indian tawny eagle (*A. vindhiana*); the small brown Wahlberg's eagle (*A. wahlbergi*) of Africa, distinguished by a slight occipital crest; and the remarkable South-African vulturine eagle (*A. verreauxi*), which differs from all the rest in having the lower part of the beak and rump white, the rest of the plumage being black. Remains of extinct eagles, some of which probably belong to *Nisaetus*, while others may pertain to *Aquila*, occur in the Miocene strata of France. The gigantic *Harpagornis*, from the superficial deposits of New Zealand, was by far the largest representative of the whole family.

Wedge-Tailed Eagle The wedge-tailed eagle (*Uroaetus audax*) of Australia is a large species generically separated from the true eagles by its regularly graduated wedge-shaped tail, in which, when closed, the middle pair of feathers are far longer than the outer ones; whereas in the true eagles the difference in the length of the corresponding feathers is inappreciable. This fine eagle attains a total of thirty-eight inches in the male, and has the general color of the plumage black, with a yellow cere and feet. In young birds the general color is rufous tawny. These birds are found both in the forests and on the open plains of Australia and Tasmania, frequently soaring at a great height in circles, with no apparent movement of the wings. The large nest is invariably placed in the fork of a gum tree, sometimes at no great height from the ground. Carrion appears to be the chief food of these eagles.

Harpy Eagles The Accipitrines we have now to consider include the harpy eagles, buzzards, and their kin, forming the subfamily *Buteoninae*. While agreeing with all the foregoing types in having the tibia considerably longer than the metatarsus, they differ from them in that the posterior aspect of the metatarsal segment of the leg is covered with large transverse plates instead of with small reticulate scales. The largest members of this subfamily are the magnificent harpy eagles, which, while rivaling the true eagles in size and strength, have the plated metatarsus of the buzzards, and may be easily recognized by their long crests of feathers. They are exclusively American, and are mainly confined to South and Central America, although one of the species ranges into Mexico. Represented by

three well-defined species, the harpies are referred to as many genera. The Guianan harpy eagle (*Morphnus guianensis*), which is the species represented in our illustration, is readily characterized by the length of its tail, which is fully four times as long as the metatarsus. The range of this species includes Amazonia and Guiana as well as Panama. The crowned harpy (*Harpyhaliaëtus coronatus*), which has a more extensive distribution, extending from Northern Patagonia and Chili to Cen-



GUIANAN HARPY EAGLE.
(One-fifth natural size.)

tral America, differs by the much shorter tail, of which the length is less than thrice that of the metatarsus. Both these species agree in that the interval between the summit of the nostril and the upper line of the beak is less than the length of the nostril; whereas in the true harpy (*Thrysaëtus harpyia*), ranging from Bolivia and Paraguay to Mexico, the corresponding interval is greater than the length of the nostril.

The largest of the three is the last-named species, of which the total length is thirty-eight inches. The figured species occupies a middle position in point of size, measuring thirty-six inches in length. Like the others, it has the greater portion of the metatarsus naked, and a powerful and strongly-curved beak. In this species the crest is very long and pointed, but varies considerably according to the age of the bird. The Prince of Wied describes the head, neck, breast, abdomen, rump, and thighs as being white, faintly spotted here and there with yellow; the feathers of the back, shoulders, and wing coverts mottled with reddish gray; the quills blackish brown, with small, reddish gray oblique bars; and the tail similarly colored, but with the bars horizontal. This stage, which is the one represented in our illustration, is, however, according to Von Penzeln, the plumage of the immature bird. The adult is much darker, having the head and throat grayish brown, most of the upper parts dark blackish brown shaded and mottled with ashy, the upper tail coverts with white tips and irregular white barrings, the chest dark colored, and the remainder of the under parts white. The dark tail, according to Dr. Sharpe, is tipped with whitish brown and crossed with only three pale bars, above which it has some whitish markings. But little is known of the mode of life of this handsome bird, which occurs both in the forest near the coasts, and the wooded districts of the plains, but more commonly on the banks of the rivers. During its periods of repose this eagle will sit for hours on the summit of some dead tree, uttering at intervals its peculiarly loud and harsh cry. Its prey comprises mammals and birds, and its nest is said to be generally built in a hollow tree. More is known concerning the true harpy eagle, which is the most powerful bird of prey in North America. It breeds in Southern Mexico, and then to Brazil and Bolivia. Known to the Spaniards as the king eagle, and to the Aztecs as the winged wolf, the harpy attacks and kills animals of more than thrice its own size and weight. Turkeys, fawns, foxes, badgers, peccaries, sloths, and monkeys alike fall victims to this fell destroyer. In regions which it frequents the harpy may be seen sailing in the early morning high up in the clear sky, or wheeling in circles over the forests; while from March to June the tree tops resound with the loud cries of its young. The nest, it is stated, may be situated either in a lofty tree or on the ledge of a cliff.

Allied Genera The whole of the three genera above mentioned are characterized by the shortness of the interval between the tips of the primary and secondary quills, which is less than the length of the metatarsus. Three other genera from South and Central America, *viz.*, *Urobitinga*, *Buteogallus*, and *Busarellus*, comprise much smaller buzzard-like birds, agreeing with the harpies in the above-mentioned characteristic but differing by the absence of crests. The last two genera have but a single species each, but there are several kinds of urobitingas, two of which range northward into the south of Mexico.

Buzzards "The buzzard," writes Gilbert White, "is a dastardly bird, and beaten not only by the raven, but even by the carrion crow;" and no better description could be given of the pusillanimous disposition of the birds of the genus *Buteo*. The buzzards are the typical representatives of the subfamily under consideration, and belong to that section in which the interval between the tips of the primary and secondary quills equals or exceeds the length of the metatarsus.

They are specially characterized by the squared tail being of considerable length, and extending markedly below the closed wings; and also by the long oval nostrils, devoid of any central tubercle, and the bare metatarsus. The beak is rather small and weak; the wings have the fourth quill the longest, and the first four deeply notched on their inner margins; the naked metatarsus is of moderate length and covered with scales and scutes; and the toes are short with strong claws. Buzzards are represented by nearly twenty species, and have an almost world-wide distribution, although they are unknown in the Indian and Malayan regions, as well as in Oceania and Australasia. The common buzzard (*B. vulgaris*) is one of the species of British



COMMON BUZZARD.
(One-fifth natural size.)

hawks which has suffered the least from the persecution of gamekeepers, and may still not unfrequently be seen in the wooded parts of the country. It belongs to a large group of the genus in which the tail is marked by more or less complete dark transverse bars, the number of such bars in this species varying from ten to thirteen. The general color of the plumage is a clear dark brown, becoming paler on the crown of the head and cheeks and much darker on the primary quills, but there is such an extraordinary amount of individual variation in respect to color, that scarcely any two birds can be found which are precisely alike. The under parts are, however, generally yellowish white, with the feathers more or less streaked with brown, but

the flanks and thighs are of a more uniformly brown hue. The under wing coverts are also light colored, and the under tail coverts white; while the tail, which is brown above and grayish white below, is barred on both aspects. Some buzzards are, however, brown all over; while in others, as in our figure, the throat and chest are brown, and as well as the thighs, are as dark as the upper surface, only the remainder of the under parts being light colored. The color of the iris varies from



ROUGH-LEGGED BUZZARD.
(One-fifth natural size)

dark hazel to light brownish yellow; the legs and toes are yellow, and the claws black. White specimens are occasionally met with. The length of the male is about twenty-two inches, and that of the female about an inch more. The common buzzard is distributed over the greater part of Europe, and is in many districts comparatively abundant. In Northern Africa and Eastern Europe it is, however, replaced by the nearly-allied desert buzzard (*B. desertorum*), which also ranges into

India; while in Japan and China its place is occupied by *B. plumipes*, distinguished by the greater extent to which the metatarsus is feathered. This species also ranges through the Himalayas to Gilgit, and occurs occasionally in India. America possesses another closely-allied species in Swainson's buzzard (*B. obsoletus*), ranging over the greater part of that continent. In searching for their prey, which consists mainly of small mammals, birds, and reptiles, buzzards fly slowly and sluggishly; and their cowardly disposition, to which allusion has already been made, is exhibited by their generally selecting young or feeble animals for their victims. At times, however, and especially in the breeding season, these birds will soar in circles high in the air, occasionally uttering their shrill and melancholy whistle-like cry. After feeding, they usually take up their station on a tree, from which, if disturbed, they fly in what appears to be a frightened manner. In England, according to Professor Newton, the nest is usually in a tree, while in the more mountainous districts of Scotland preference is given to rocks. The eggs, which are usually two or three, but occasionally four in number, much resemble those of the red kite. In America Captain Bendire relates that Swainson's buzzard has been observed nesting in harmonious association with other birds, especially with Arkansas kingbirds and shrikes; the nests of these birds being sometimes only a few inches below those of the buzzards. Fossilized remains of the common buzzard have been found in caverns in Devonshire and Westmoreland; the metatarsus figured on p. 1904 coming from the latter county.

Although the rough-legged buzzards, of which there are but very few species, differ from the true buzzards merely in having the metatarsus feathered right down to the toes, it is found convenient to distinguish them by a separate generic name. Their range includes Central and Northern Europe, Northern Asia, and the whole of North America; the European species sometimes straggling as far as South Africa. The European rough-legged buzzard (*Archibuteo lagopus*) — the species represented in our illustration — is a bird somewhat larger than the common buzzard, and not exhibiting quite as much individual variation in color as the latter. Ranging over Northern and Central Europe and Siberia, this buzzard is met with yearly in the British Islands, where it sometimes occurs in considerable numbers, more especially in the autumn and winter. In the case of such a variable bird it will be unnecessary to give any description of the coloration, beyond stating that, according to Dr. Sharpe, the species is specially characterized by the brown color of the markings on the flanks and thighs; and by the ground color of the head, throat, and chest being white or buffish white, upon which are buff streaks. In North America this species is replaced by St. John's buzzard (*A. sancti-johannis*), distinguished by its generally darker color and the larger amount of black on the lower surface. The ferruginous buzzard (*A. ferrugineus*) of Southwestern North America differs by the white flanks and the chestnut fawn of the flanks. A fourth species (*A. strophiatius*), characterized by its uniformly brown head, neck, and chest, inhabits Nipal and Tibet. The habits of the rough-legged buzzards are so generally similar to those of the members of the genus *Buteo*, that they require but brief notice. The individuals of the European species visiting Britain prefer, however, according to Professor Newton, open districts,

more especially where rabbits are abundant; those rodents together with waterfowl, constituting a large proportion of their food. The same writer describes the flight of the bird as slow but smooth, and, except during the periods of migration, not of long continuance. The nest, which is made rather late in the season, is generally placed in a high tree, and may contain from three to five eggs, the latter being subject to great variation in form, size, and coloration. Breeding commonly in the higher parts of Norway and Sweden, the rough-legged buzzard ranges as far poleward as Cape North, and at times nests in the British Islands. During the breeding season it utters a kind of wailing cry, which has been compared to the mew of a cat. America possesses four other genera of buzzard-like hawks, of which only *Asturina* possesses more than two species; and a fifth genus (*Urospizias*), with one species, is confined to Australia.

**Sparrow
Hawks**

With the possible exception of some of the American forms just alluded to, the Accipitrines hitherto described have the metatarsus considerably shorter than the tibia. We now come to a group of long-legged hawks characterized by the great elongation of the metatarsus, which is approximately or quite equal in this respect to the tibia. This group, as represented by the sparrow hawks, goshawks, and harriers, constitutes the subfamily *Accipitrinae*. For its size, the common sparrow hawk is one of the most dashing and rapacious of all the Accipitrines, although its depredations are too frequently attributed to the harmless kestrel. In common with its congeners, the sparrow hawk agrees with the great majority of the subfamily in having the sides of the face completely feathered, and the lores furnished with bristles, while it resembles a smaller number of genera in the absence of reticulated scales on the back of the metatarsus. Sparrow hawks may be distinguished from all their allies by the great length of the third toe, which (exclusive of the claw) is more than double the length of the ridge of the beak, measured from the front edge of the cere. The short beak curves regularly from the base, and has a distinct festoon in the upper cutting edge, while the nostrils are oval. The wings are short, not reaching within a long distance of the end of the tail, and have the fourth and fifth quills nearly equal and longer than the others. The long metatarsus is smooth, being covered with greave-like plates, and the toes are long and slender, with sharp, curved claws. There are more than twenty species of sparrow hawks, which are distributed over the whole globe, with the exception of Oceania, the west of Australia, and New Guinea. A few are rather larger than the European species, while many are considerably smaller. The common sparrow hawk (*Accipiter nisus*) is still an abundant bird in the wooded districts of England, and the female is the only Accipitrine which inflicts much damage upon game preserves. It belongs to a group of the genus characterized by the banded thighs, the absence of a collar round the neck, and the number of bars on the tail not exceeding five. In the adult male the plumage of the upper parts, with the exception of a white spot on the nape of the neck, is dark bluish gray, while the cheeks, chin, and under parts are rufous, barred with bands of dark rufous brown, narrower than the intervening light spaces; the tail being grayish brown, with from three to five dark bands. The beak is blue, and the iris orange; the legs and toes are yellow, and the claws black. The total

length is about thirteen inches. The female is some two and one-half inches longer than the male, and differs by the general color of the upper parts (save the white spot on the nape) being brown, with many of the feathers white at the base, and the primaries and tail lighter than the rest; the under parts being grayish white barred with brown. This species is distributed over the whole of Europe and Northern Asia, and extends during the winter into the north of Africa, India, and



SPARROW HAWK.
(One-half natural size.)

China. In certain parts of Germany, Switzerland, and France, some individuals are found differing by their superior size and certain peculiarities in coloration. The sparrow hawk is a frequenter of wooded districts, where it may always be distinguished from the kestrel when on the wing by its bold dashing flight. Its prey includes the smaller mammals and birds, and while young pheasants and partridges frequently fall victims to its swoop, the chickens in a farmyard are by no means

secure from its rapaciousness. It is during the breeding season that this hawk displays the greatest boldness and most frequently ventures into the farmyard; such visits being paid as much for the purpose of capturing sparrows and other small birds as for preying on chickens. The sparrow hawk breeds from the extreme north of Europe as far south as the Himalayas, and although generally constructing a nest of its own, not unfrequently takes possession of that of a crow or some other bird. The eggs are four or five in number, and are remarkable for the beauty of their coloring, being generally blotched with large patches of brownish crimson on a pale ground; the dark markings being often collected on certain parts of the shell, leaving the rest bare.

In Europe the sparrow hawk used to be extensively employed in hawking, and was flown against blackbirds, thrushes, quail, landrails, partridges, etc. Quail hawking with this bird is still largely pursued in Hungary and the Danubian provinces; and it is stated that it was considered no uncommon feat for a sparrow hawk to kill from seventy to eighty quail in a day. In India both this species and the smaller besra hawk (*A. virgatus*)—the latter distinguished by its uniformly-colored thighs—are largely trained. On this subject Mr. R. Thompson writes to Mr. Hume that though the sparrow hawk is prized by the natives for its speed and pluck, “it does not really come up to the besra even for courage; its powers of endurance are much less, and it is less easily reclaimed. It is a delicate and difficult bird to keep, and with all its boasted speed is but second to the besra for every kind of hard field or wood work. What the besra would do at the first throw, the other could not accomplish till the quarry was exhausted. To hunt with the basha [the native name of the sparrow hawk] requires a deal of tact; you must not throw it while the wind is high; you must keep well within the proximity of woods and trees, and not balk it with birds larger than it can afford to strike and clutch.” Both these kinds of hawks are commonly flown in India at sand grouse and the cream-colored courser. In North America the sparrow hawk is represented by two nearly-allied species known as the sharp-shinned hawk (*A. fuscus*), and Cooper’s hawk (*A. cooperi*), in both of which the rufous bars on the under surface are wider than the intervening spaces. While the former is somewhat smaller than the sparrow hawk, the latter is as much larger.

Goshawks The European goshawk, or goose hawk (*Astur palumbarius*), is the type of a very large genus, differing from the last by the length of the ridge of the beak from in front of the cere exceeding half the length of the third toe without the claw; and further distinguished by the fourth toe being about equal in length to the second, without the claws; by the overhanging tufts of feathers on the thighs, and the absence of any tubercle in the bony nostrils. The beak is short, with a distinct festoon in its cutting edge; the short wings generally have the fourth quill the longest; the metatarsus usually has large scutes in front, and the toes are of only moderate length. Goshawks have an almost cosmopolitan distribution, although they are unknown in part of Oceania and the southern portion of South America. While the more typical forms are equal in size to the largest falcons, the smaller kinds are not larger than sparrow hawks; and so closely are the goshawks and sparrow hawks thus connected, that some

writers, like Messrs. Seebohm and Bendire, unite the two genera. In general appearance the European goshawk is, indeed, very like a large sparrow hawk; having, in the male, the plumage of the upper parts of a deep bluish gray, darker on the head and neck, with a light band above the eye; while beneath it is white transversely barred with grayish brown; the tail having four dark bars, and a white tip. In the female the upper plumage has a browner tinge; while the young bird is brown above, with five dark bars on the tail. The color of the beak, cere, and limbs is nearly the same as in the sparrow hawk. The male attains a length of nineteen and one-half, and the female of twenty-three inches. The goshawk has a range nearly the same as that of the sparrow hawk, although it does not appear to



ADULT GOSHAWK RABBIT HAWKING.

descend from the Himalayas to the plains of India. In North America it is replaced by the American goshawk (*A. atricapillus*), distinguished by its slightly superior size, and by the plumage of the under parts being merely flecked with ashy gray, instead of barred. Although rare in Britain, the goshawk is common in Germany and other parts of the Continent, breeding as far north as Lapland. Instead of "stooping" to its quarry, after the manner of the falcons, the goshawk flies along after it, and takes by the mode technically known as "raking." It is flown at the larger game birds, as well as at hares and rabbits, and will not unfrequently follow its prey for some distance in covert. The nest is usually built in a tall tree on the

outskirts of a wood or forest, and may contain from three to four eggs, which are white, and may be either unspotted, or more or less streaked with olive, or flecked with reddish brown.

**Whistling
Hawks** Nearly allied to the goshawks is a group of African species (one of which is represented on the right side of the illustration on p. 2008), characterized by the possession of a more tuneful voice than hawks in general. By recent observers the note of these birds is described as a mellow piping whistle, and, accordingly, it seems better that they should be designated whistling hawks, rather than "chanting goshawks," as they were originally termed, when somewhat exaggerated notions obtained as to the extent of their vocal powers. These hawks differ from the goshawks by the presence of a tubercle in the nostrils, situated near the upper margin; while they are distinguished from an allied South-American genus by the small extent to which the metatarsus is feathered, and by the whole of the outer side of that segment of the leg being covered with reticulate scales.

The many-zoned hawk (*Melierax polyzonus*), which is the species represented in our illustration, is a large and handsomely-colored bird inhabiting Northeastern Africa, and ranging thence across the continent to Senegambia. The males measure twenty and one-half inches, and the females twenty-one inches in length. Like all the species save one, the general color of the upper parts is pearly gray, the chest ashy gray, and the abdomen white, barred with a number of very fine grayish-black bands, so as to present a kind of speckled appearance. The species is particularly characterized by the absence of bars on the middle tail feathers, and the white upper tail coverts barred with slaty gray. The bill is blackish, with a vermilion base, the iris pale brown, and the legs, feet, and cere vermilion. A nearly-allied species is the South-African whistling hawk (*M. canorus*); but the much smaller and widely distributed black whistling hawk (*M. niger*) differs from all the others by its sable plumage, in striking contrast to which stands out the brilliant red of the iris, cere, base of the bill, and feet and legs. In Abyssinia the figured species is found at considerable elevations above the sea. Mr. Blanford states that it is usually to be seen perched on a tree, although occasionally on the ground, and that its food consists of reptiles and insects. Its flight is rather slow, and somewhat like that of a buzzard, and is seldom prolonged for any great distance.

**Harrier
Hawks** Omitting mention of three unimportant genera, two of which are South American and the other West African, we come to the American harrier hawks, and the cosmopolitan harriers; both of which are distinguished from all the foregoing types by having an imperfect disc of feathers round the eyes,—thus recalling the owls,—and also by the hinder aspect of the metatarsus being covered with reticulate scales, instead of large scutes. With regard to the harrier hawks (*Micrastur*), of which there are several species, ranging from Southern Mexico over the greater part of South America, it will suffice to state that they are distinguished by having circular nostrils with a bony excrescence, and form an intermediate step between the goshawks and the harriers, having the heavy build of the former, and the facial discs of the latter.



GROUP OF HARRIERS.

(2006)

1. Hen Harrier; 2. Montagu's Harrier; 3. Pale-Chested Harrier.

Harriers

The harriers, of which there are some sixteen species, are long-winged and slender-built birds, remarkable for the great diversity existing in most cases between the plumage of the two sexes, and deriving their name from their harrying propensities. The nostrils differ from those of the harrier hawks in being oval, and devoid of any bony excrescence; they are partly concealed by the radiating feathers of the lores. The beak is small, curving regularly from the base, and with only a slight festoon in its upper cutting edge. The long wings have the first quill very short, and the third and fourth the longest, and the tail is of considerable length, and rounded. In length the metatarsus is relatively greater than in any other members of the family, the toes are somewhat short and not very unequal in length, and the claws are very sharp and but slightly curved. Harriers are distributed over the greater part of the globe, occurring in such widely-distant countries as New Zealand and Britain, although they are absent from several regions, such as Malayana, Persia, and Arabia, where they might reasonably have been expected to occur. Of the numerous species of the genus, no less than three inhabit the British Islands; although the drainage of the fen lands has sadly reduced their numbers, more especially in the case of the marsh harrier. In habits all the harriers are very similar, although some, like the species last named, prefer low marshy spots, where they may be seen with their heavy flapping wings slowly skimming over the reeds; while others, like the hen harrier, also frequent the drier hillsides. They all roost on or near the ground, and when not hunting, may be seen, as in our illustration, perched on some low bough, post, or hillock. They hunt their prey to a great extent in the mornings and evenings, and feed on small birds, mammals, and reptiles; the marshy-hunting species supplementing this diet largely with frogs and fish, while others eat grasshoppers and other large insects. The nest is usually placed on the ground, and in the European species at least the eggs (three or four in number) are nearly uniform pale-bluish or yellowish green. In addition to their facial disc and crepuscular habits, the harriers show another resemblance to the owls in their habit of laying their eggs at intervals, so that both eggs and nestlings may be taken from the same nest. In hunting, harriers frequently beat and quarter their ground almost with the regularity of a spaniel. Our remarks on the various species will be mainly confined to those inhabiting the British Islands. So different in appearance are the males and females of the hen harrier (*Circus cyaneus*) that they were long regarded as distinct,—the female being termed the ringtail,—and it was not till Montagu brought up a brood from the nest that their specific unity was established. In the adult male the general color of the plumage is bluish gray above, with the throat and chest nearly similar; while the rest of the under parts, inclusive of the thighs as well as the upper tail coverts, are pure white. On the upper surface of the tail the two middle pairs of feathers are uniform gray, and the others more or less indistinctly barred. On the other hand, in the female, or ringtail, as shown in the left lower figure of our plate, the prevailing hue of the upper parts is brown, and the head is surrounded by a distinct ruff of mingled white and brown feathers; many of the feathers, especially the wing coverts, having lighter margins. Below, the ground color is reddish buff, each feather having a larger or smaller dark brown central mark, and a still darker shaft.

The tail is grayish brown, tipped with white, and all the feathers banded with darker brown. In both sexes the legs and toes are yellow, with black claws; but the cere is a more greenish yellow in the female than in the male. The young male resembles the female in color, but may be distinguished by its relatively-shorter wing. In length the male measures about twenty-one and the female twenty-two inches. This harrier is found throughout Europe and Siberia; extending in winter into the northeast of Africa, Northern India, and China. The American harrier (*C. hudson-*



AFRICAN NAKED-CHEEKED HAWK AND MANY-ZONED WHISTLING HAWK.
(One-sixth natural size.)

nianus), commonly known as the marsh hawk, replaces the hen harrier in North America, and is distinguished by the more decided gray of the upper parts and throat, as well as by some flecks of reddish brown on the white of the under surface in the male; the naked portion of the metatarsus is also slightly longer. In Britain the hen harrier seems always to have been the rarest species, but the effects of drainage have not told so severely upon its numbers as on those of the marsh har-

rier. The pale-chested harrier (*C. macrurus*), of which the male is represented in the right side of our plate, is a slightly smaller bird than either of the last two, from both of which it may be at once distinguished by the white upper tail coverts being banded with gray. The uniformly-colored middle tail feathers distinctive of the males of this group of species are well shown in our plate. The pale harrier, although unknown in Britain, is pretty generally distributed over Europe as far north as the 60th parallel; it is also found over the great part of Africa, exclusive of the forest regions of the west coast, and eastward ranges into India, Burma, and China. The harrier (*C. pygargus*) which takes its popular name from the distinguished ornithologist Montagu, by whom it was first recognized as a distinct species, and of which a male is represented in the upper figure of the plate, differs from the species referred to above by the white thighs of the male being flecked with reddish brown, and may be still more readily recognized by the three dark bands crossing the secondaries, one of which is visible when the wings are closed. The middle tail feathers are uniform bluish gray, and the lateral ones white with reddish-orange bars; the under parts, behind the chest, being colored like the latter. The general color of the female is brown of various shades. Montagu's harrier is lighter and more slenderly built than the hen harrier, and appears to have been the most common of the British species. Its distribution is almost identical with that of the pale harrier. The largest and most powerful of all the three British species is the marsh harrier, or moor buzzard (*C. æruginosus*), in which the female measures twenty-three inches in length. In this species the two sexes are nearly alike at all ages, the prevailing color of the plumage of the upper parts being brown. It may be recognized by the nearly-uniform rufous thighs, and the plain bluish-gray tail of the adult; young birds have the tail brown, with some slight rufous mottlings, and lack the blue gray found on the secondaries of the old birds. The distribution of the marsh harrier is likewise very similar to that of the two preceding species; this bird ranging from Britain to Japan, and from Siberia to South Africa and India. The draining of the fens and other of its haunts has rendered it a comparatively rare bird in England at the present time.

Resembling the whistling hawks in the barred plumage of the under parts, the naked-cheeked hawks of Africa and Madagascar, one of which is represented on the left side of the preceding illustration, differ from all the other members of the subfamily in having the region of the mouth and the sides of the face completely devoid of feathers. The African species (*Polyboroides typicus*) measures twenty-seven and one-half inches in the female, and two inches in the male. Its general color above is dark gray, this tint extending round the neck to occupy the throat and chest, while the remainder of the under parts is marked with rather broad alternating bands of black and white. The head is crested, and the black tail has a narrow white tip, and a broadish band of white at a distance of about one-third from the end. This species has a wide range in Africa; but it is replaced in Madagascar by *P. radiatus*, distinguished by its silver-gray color above, and the finer banding of the under parts. These birds prey chiefly upon lizards, snakes, and frogs, and they possess the unique peculiarity of being able to move the ankle joint both forward as well as

Naked-
Cheeked
Hawks

backward, thus giving an extraordinary range of movement to the lower part of the leg, which is said to be of the greatest advantage in extracting their reptilian prey from the crannies where they lie concealed. Like the harpy eagles, these hawks often seek for reptiles along the line of jungle fires, while they frequent marshes and swamps in search of frogs. The toes are remarkable for their extreme lateral compression, which is said to be also a feature admirably adapted for capturing the reptiles on which these birds prey. In addition to reptiles, it is stated that these hawks will also kill and eat small birds and mammals, especially such of the latter as, like shrews, frequent moist localities. Nothing appears to have been ascertained with regard to their breeding habits.

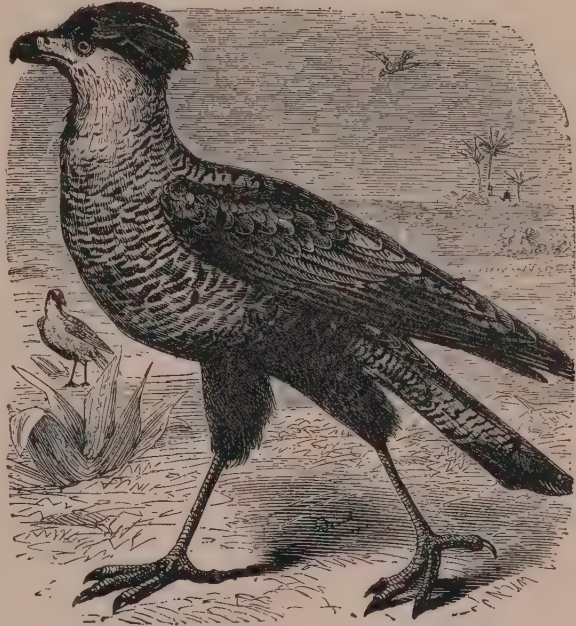
The remaining members of the Hawk family are mainly South American, and constitute a subfamily by themselves. These birds, which are commonly designated caracaras, from a corruption of the native name of their Brazilian representatives, differ not only in general appearance from more typical hawks, but likewise in the mode of life. In the first place, whereas in all other members of the family the third and fourth toes alone are connected at their bases by a small web, in the caracaras both the second and fourth toes are so connected with the middle one. They are all long-legged birds, with the metatarsus naked, and the beak is generally characterized by its depth and compression, while there is more or less naked skin on the sides of the face. In their general habits they are chiefly terrestrial, and nest on the ground; and as they run well and rapidly, they recall in these respects the gallinaceous birds. Mr. W. H. Hudson remarks that they are "carion eaters, also killers on their own account, and, like wild dogs, sometimes hunt in packs, which gives them an advantage. They are the unfailing attendants of all flesh hunters, human or feline, and also furiously pursue and persecute all eagles and true vultures that venture on the pampas." Formerly the caracaras were considered to be allied to the secretary vulture, but their true affinities are now known to be nearer to the harriers, and, according to the observer just quoted, when on the wing the smaller species present a striking resemblance to the latter.

The caracaras may be divided into two genera, according to the form of the nostrils. The largest member of the group is the Brazilian caracara, known in the Argentine as the carancha (*Polyborus tharus*), and belonging to the genus with oval nostrils. This fine bird, which ranges over the whole of South America, may be compared in size to a small eagle, attaining a length of fully twenty-six inches. Its head is crested, and the ground color of the upper parts deep blackish brown, with the feathers of the back and wing coverts marked with narrow whitish crossbars. The tail is mostly buffish white, with darker bars, and the sides of the head and under parts are of the same ground color, marked, except on the head and throat, with narrow black bars. The large beak is pale blue, the cere and naked portion of the face are normally carmine red, and the legs and feet yellow. Under certain conditions naked portions of the face may, however, assume a pale color. In Northern South America, as well as in Central America, and Southern North America, together with Cuba and Trinidad, there occurs the rather smaller Audubon's caracara (*P. cheriway*); and a third

species (*P. lutosus*) characterizes the island of Guadeloupe. Although largely carrion eaters, these birds will attack living prey, the Brazilian species sometimes venturing to encounter the skunk. In North America they generally nest in cabbage palms.

This species
Falkland (Ibycter australis),
Island which is repre-
Caracara sented in the upper

figure of our illustration, may be taken as a well-known example of the second genus, in which the nostrils are circular, and most of the species of considerably smaller dimensions than the last. This bird attains a total length of twenty-five inches, and has its plumage of a general black hue. The nape and neck are, however, marked with streaks of white, and there are also similar white markings on the throat and chest, which on the abdomen pass into minute



BRAZILIAN CARACARA.

spots. The quills are dark brown, with lighter tips, and the black tail has a broad white band at the end. The feathers on the inner surfaces of the thighs are tawny, the cere and feet are yellow, the greater part of the beak is yellowish, and the iris brown. This species is restricted to the Falkland islands, and is replaced in the Amazon districts and some adjacent parts of South America by the black caracara (*I. ater*), which is a much smaller bird, measuring only sixteen inches in length, and characterized by the whole plumage, with the exception of a white band across the base of the tail, being black, with greenish reflections. Agreeing in size with the black caracara is the very differently-colored bird known as the chimachima (*I. chimachima*), of which an immature example is represented in the lower figure of our illustration. This caracara ranges from Brazil northward of the tropic, through Colombia into Panama. In the adult the prevailing color may be said to be white; a streak from the eye toward the back of the head, the back, wings, and tail being mainly dark brown, with lighter margins to many of the feathers. The first four primary quills are white with dark markings in the middle of their length, while the remainder are yellowish white at the base, with dark brown tips. The tail feathers have a lightish ground, marked with narrow brown bars for the greater part of their length, but near the end show a broad blackish band tipped with white. The iris of the large eye is grayish brown; the beak is bluish white at the base, becoming lighter at the tip; the cere and a bare space round the eye are orange tinged with red, and the feet are pale yellow. In young birds the top of the head

and cheeks are dark brown; the sides and back of the neck brown, with yellowish-white streaks; the feathers of the back brown, with straw-colored or fulvous margins, and the feathers of most of the under parts ochrey colored, with brown margins in the region of the chest, whereby a general striped appearance is produced. The chimango (*I. chimango*) of the southern portion of South America and Tierra del Fuego differs by having the under parts and under wing coverts of a brownish-



FALKLAND ISLAND AND CHIMACHIMA CARACARAS.
(One-fourth natural size.)

ochre color in the adult; the feathers of the under surface of the body having dark brown shaft stripes.

Writing of the habits of these birds, which he collectively designates carrion hawks, Darwin states that chimangos may often be seen in company with caranchas, although the two are by no means friends. "When the carancha is quietly seated on the branch of a tree or on the ground, the chimango often continues for a long

time flying backward and forward, up and down, in a semicircle, trying each time at the bottom of the curve to strike its larger relative. The carancha takes little notice, except by bobbing its head." Of the Falkland island species he observes that "these birds in many respects resemble the caranchas. They live on the flesh of dead animals and on marine productions, and on the Ramirez rocks their whole sustenance must depend on the sea. They are extraordinarily tame and fearless, and haunt the neighborhood of houses for offal. If a hunting party kills an animal, a number soon collect and patiently await, standing on the ground on all sides. After eating, their uncovered craws are largely protruded, giving them a disgusting appearance. They readily attack wounded birds; a cormorant in this state having taken to the shore, was immediately seized on by several, and its death hastened by their blows." He adds that like the caranchas, several of these birds will sometimes "wait at the mouth of a rabbit hole, and together seize on the animal when it comes out." In addition to being exceedingly mischievous, these caracaras are "quarrelsome and very passionate, tearing up the grass with their bills from rage. They are not truly gregarious; they do not soar, and their flight is heavy and clumsy; on the ground they run extremely fast, very much like pheasants. They are noisy, uttering several harsh cries, one of which is exceedingly like that of the English rook; hence the sealers always call them rooks. It is a curious circumstance that, when crying out, they throw their heads upward and backward, after the same manner as the carancha. They build in the rocky cliffs of the seacoast, but only on the small adjoining islets, and not on the two main islands; this is a singular precaution in so tame and fearless a bird." In the North-American species of *Polyborus* the eggs are generally two or three in number, and have a pale ground color, almost concealed by dark blotchings.

THE VULTURES

Family *VULTURIDÆ*

As a matter of convenience it is found advisable to separate the true or Old-World vultures from the Hawk family, although it is difficult to draw any well-marked line of distinction between the two groups, which are intimately connected by the lammergeiers. All the vultures are, however, birds of large size, and, with the exception of the lammergeiers, characterized by the head and neck being more or less bare, or clothed only with short stubbly down, true feathers being absent from the crown of the head. The males are as large or larger than the females. In all, the beak is rather long, compressed, and straight for some distance from its base, after which it is sharply bent down; its upper mandible may be sinuated, but is never toothed. The cere is very large, and the metatarsus, which is generally naked, is comparatively short, stout, and covered with small reticulated scales. The toes have rather long and slightly-curved claws; the third toe being always long and the first short, while the third and fourth are joined at their bases by a membrane. As in the preceding family, the nostrils are separated by a median

partition, and the feathers are furnished with aftershafts. The true vultures, together with the lammergeiers, are restricted to the warmer regions of the Old World, where they are almost universally distributed, although absent from the Malayan Islands, Ceylon, Madagascar, and Australia.

The magnificent bird known as the lammergeier, or bearded vulture **Lammergeiers** (*Gypaëtus barbatus*), is the typical representative of a genus in regard to the systematic position of which there has been some difference of opinion among ornithologists. It differs from the true vultures in having the head covered with feathers, instead of being naked or downy, and thereby approaches the eagles, among which it is placed by Dr. Sharpe. Its general affinities, as remarked by Mr. Dresser, are, however, decidedly with the vultures, among which we accordingly place it. In addition to having the head fully feathered, the lammergeiers are characterized by having the oval nostrils concealed by a number of stiff bristles, and also by the presence of a tuft, or long beard of forwardly directed bristles. The long and compressed beak ascends in front of the cere, and then curves, with its tip much hooked. The wings are long, with the first quill rather longer than the second, and the third the longest; while the tail is also long, and distinctly wedge shaped. The true lammergeier, which ranges from the mountains of Southern Europe and Northeastern Africa through Asia Minor and Palestine, and thence to the Himalayas, Central Asia, and the north of China, is distinguished by the metatarsus being feathered down to the toes, and the presence of black markings on the cheeks, and commonly attains a length of about forty-two inches. On the other hand, the somewhat smaller bare-legged lammergeier, from the mountainous districts of Northeast and South Africa, has the lower part of the metatarsus naked, and the sides of the cheeks entirely white. In the adult of the common species, the crown of the head and sides of the face are white, with the bristles over the nostrils and a broad cheek stripe, as well as some scattered streaks, black; the rest of the head and nape being whitish, with the lanceolate feathers of the latter more or less tinged with bright tawny. The upper parts are black, tending to brown on the rump, and a tinge of ochre brown on the scapulars, with all the shafts of the back feathers whitish, as are those of the wing coverts, wings, and tail. Beneath, the general color is a rich orange tawny, not unfrequently with a black gorget on the chest. The beak is horn color, and the feet leaden gray; while the iris of the eye is pale orange, and the surrounding sclerotic membrane or "white," a blood color, thus producing, with the black pupil, a most remarkable appearance. In the young bird, as shown in the upper figure of our illustration on the next page, the head, neck, and throat are blackish brown, and the rest of the body plumage pale brown, with the exception of some creamy-white patches on the upper part of the back. The female is somewhat larger than the male, and the expanse of wing often exceeds nine feet. Indian examples are those which commonly show the black gorget on the chest.

The lammergeier is essentially a mountain bird, and, in spite of numerous stories to the contrary, appears to subsist mainly on animals not killed by itself and carrion, although it may occasionally attack and kill some of the smaller animals; such at least are undoubtedly its habits in the Himalayas. When on the wing, the

lammergeier may be easily recognized by its long, pointed wings and tail, and also by its mode of flight, which is even and gliding, with an occasional flap of the wings.



LAMMERGEIER AND NEST.

When hunting, it skims along the sides of the mountains, following every undulation of the hillside, and working backward and forward in regular "beats," so that scarcely anything escapes its search. In the Alps the lammergeier is now well-nigh

exterminated, the last Swiss specimen having been found poisoned in the winter of 1887. This was a female which had been known to haunt the Bietsch Horn for some twenty-five years previously, its mate having been killed in 1862. It is stated, however, that a single bird was seen in Switzerland in 1888. In the Italian Alps the lammergeier is still met with, while in Spain and the Caucasus it is abundant. In the Himalayas these splendid birds may be seen in numbers during the spring in the outer ranges, especially in the neighborhood of the hill station of Mari, but in the summer they migrate northward to Kashmir, Baltistan, Ladakh, etc. Usually a shy bird, in the neighborhood of Abbotabad the lammergeiers became quite accustomed to the shooting on a rifle range, and would approach close to the men. When driven down by cold and bad weather they will often collect in numbers round the military hill camps to feed on the offal. Circumstantial stories of attacks by Alpine lammergeiers on children will be found in many works; but, as Mr. H. Saunders remarks, those who have examined the weak feet of those birds will form their own opinion as to their credibility. With regard to their alleged depredations on flocks, an anonymous observer writes in the *Asian* that "I never heard of the Himalayan lammergeier attacking anything, and in Kashmir have often watched them passing over flocks of goats, on one occasion close over some female ibex with kids. Also in Dagshai I frequently observed them sail round within a few yards of fowls and tame pigeons, but never saw them attempt a raid on any living thing, always contenting themselves with bones thrown out after the soldiers' dinners, or with offal from the slaughterhouses." Mr. R. Thompson also had a similar experience in the Himalayas, mentioning, that although these birds never molested the fowls and pigeons picketed as lures for hawks, they would always come down to a carcass or a heap of bones. The lammergeier seems indeed to be specially partial to bones, which it will sometimes drop from a great height on to rocks in order to smash them; while in Algeria it is stated to do the same with tortoises. In Spain these birds are commonly known by the name of bone smasher, and there is little doubt that the "ossifrage" of Scripture refers to this bird. All these traits of character strongly confirm the view that the lammergeier is a vulture rather than an eagle, and Mr. Hume considers that its general habits and gait, more especially its manner of walking and holding its tail when feeding on the ground, ally it to the scavenger vultures. In the Himalayas the lammergeier breeds from November to February, selecting almost inaccessible ledges for the construction of its nest, at elevations of five thousand feet and upward. Mr. Thompson states that "the nest a huge platform, some four or five feet in diameter, is constructed of small sticks and thick twigs, placed so as to form a footing for the young, and is lined with pieces of cloth, rags, etc." There is usually, both in the Himalayas and the Atlas, but a single egg to a nest, although, rarely, a pair may be met with. The eggs are oval, and rather small for the size of the bird, with their external surface dull and chalky, of a buff ground color, often clouded with darker markings. The young bird has been known to remain in the nest for upward of four months.

The typical representative of the true vultures, and the only living member of its genus, is the common cinereous or black vulture (*Vultur monachus*), of which figures are given in the accompanying plate, which differs from all other members

Cinereous
Vulture

of the family in its circular nostrils. This bird derives its name from the plumage being generally entirely black, with chocolate reflections. The head is covered with thick velvety down, developed to form a conspicuous patch at the occiput, and on the cheeks more silky and produced into tufts. The naked portions of the head and neck are of a livid flesh color, while the iris is dark brown, the bill black, and the foot yellowish. In total length the bird is about forty-two inches. This vulture inhabits the countries bordering both sides of the Mediterranean, whence it extends eastward to India and China. Unlike the griffon vulture, to be next mentioned, this species is partial to wooded districts; although, as in our plate, both may frequently meet over the same carcass. It nests generally in trees, although failing these on rocks, and builds a bulky nest of boughs lined with twigs, in which a single large white egg, more or less richly marked with red, is laid. Like its kin, the black vulture is a bird of heavy and ungraceful form and a generally repulsive appearance; its habits, when not engaged in feeding, being sluggish and inert, its attitude slouching, and its disposition cowardly. It also resembles its allies in feeding entirely upon dead animals and other refuse; and it is these carrion-eating habits which render vultures so invaluable in tropical countries, where the care bestowed upon sanitary matters appears to vary inversely with the rise of the temperature. Repulsive and hideous looking as are a group of vultures assembled round the carcass of a large animal, and gorging themselves to satiety upon its contents, their appearance is very different as they are seen wheeling in circles at a great height in the blue sky of a tropical noon, and no spectacle is more interesting than to watch the vultures flocking up from all parts when some of their number have detected a prey, and dropped to earth to feast upon it. Much discussion has taken place with regard to the manner in which vultures discover their prey, although it is now ascertained that this is mainly due to their marvelously keen power of sight. On this subject Jerdon writes that he has "known a small piece of fresh meat—a fore-quarter of a miserable sheep—exposed in the open bare plain where the eye barely discovered a few floating specks in the air high above, and in less than half an hour there would be a number of vultures feeding on it. It is out of the question that smell can have anything to do with this, and we know from experiments that vultures will discover and descend on a stuffed carcass of an animal, while they will neglect one well hidden, although putrid and offensive. I do not mean to assert that their sense of sight is illimitable, and, in the cases in which I have myself experimented, I do not mean to imply that the very distant birds, that looked like specks, were those to discover the piece of fresh meat; but ever and anon a bird at a much lower elevation, but still very high above the earth, would sail past, keenly urged by hunger to a closer investigation and on his espying the morsel, and moving toward it, others at a greater distance, urged by his motions, would descend lower, and on being certified themselves, perhaps on the ground near, would drop down in a series of oblique plunges till they reached the ground also. That vultures, however, have also a strong sense of smell is undeniable; many experiments are recorded to show this; and I have myself frequently seen them flying closely, and apparently in an excited and unusual manner, over a copse or thicket in which a putrefying carcass was placed."



GROUP OF EUROPEAN VULTURES.
1. Black Vulture; 2. Egyptian Vulture; 3. Griffon Vulture.

It is, however, only when the birds are flying at a low elevation that they are able to detect such hidden carrion. Not uncommon in the Himalayas at all seasons, the cinereous vulture visits the plains of Northern India during the winter, and is in some districts one of the commonest of its tribe at that season. Some individuals are of much lighter color than the typical form; but there is every gradation in the color of the plumage from one to the other. In Bulgaria the breeding season commences early in March, and the young birds are described as ugly in the extreme, being covered with brownish-gray down, and having a pink cere and pale yellow legs and feet.

Griffon

Vultures

The second European representative of the true vultures is the griffon vulture (*Gyps fulvus*), of which examples are shown on the right side of our plate. Together with several other species, it constitutes a genus characterized by the somewhat oval and transversely-placed nostrils, by the length of the metatarsus being less than that of the third toe, and the presence of fourteen feathers in the tail. The vultures of this genus range over the whole of Africa except the forest districts of the west coast, the countries bordering the Mediterranean, a considerable portion of Eastern Europe, and thence through Persia to India, and so on to Siam and the Malay Peninsula. The griffon, or fulvous vulture, is a very variable species, ranging from Spain and Northeastern Africa to India and Turkestan, the eastern form having a more rufous tinge of plumage. It is specially characterized by the feathers of the rump and lower part of the back having a pale centre along the shaft, and by the under wing coverts being ashy or tawny rufous. In the typical form from Eastern Europe the large ruff round the throat is white, and the upper parts of the body ashy fulvous, the rump and lower portion of the back being dark brown, with the above-mentioned fulvous centres to the feathers, while the wing coverts are mostly edged and tipped with creamy white, and the upper tail coverts pale-ochrey buff. The quills and tail are black; and the under parts pale-creamy brown, with narrow whitish shaft stripes to the feathers. The iris is reddish orange, the cere bluish black, the bill pale-horn color, and the foot leaden gray. The total length of the bird is about forty inches. The Himalayan griffon (*G. himalayensis*), ranging from the Himalayas to Turkestan, differs by the white under wing coverts; while the African Rüppell's vulture (*G. rueppelli*), represented in the illustration on p. 2020, may always be distinguished by the feathers on the lower part of the back and rump being brown with broad gray or fulvous margins, instead of with light centres. Moreover, the ruff is yellowish white, and the beak deep orange. The long-billed griffon (*G. indicus*) is rather smaller than the typical form of the common species, and differs from all the rest by its unusually bare head and thin beak, and is further characterized by the feathers on the lower part of the back and rump being whitish with faint brownish margins. It is an inhabitant of India and the countries bordering the eastern side of the Bay of Bengal. An extinct griffon vulture occurs in the Miocene deposits of Malta.

Unlike the black vulture, the European griffon vulture frequents open and rocky districts. Regarding its flight, Mr. O. Salvin writes that "it is a fine sight to watch the ease with which the griffon sails through the air; the

apparently effortless extension of the wings seems amply sufficient to sustain its huge body, and no flapping motion is necessary to enable it to mount to a great height. It is only on leaving a rock that a few strokes are requisite to attain the necessary impulse, after which, with primaries bent upward by the force of the air, it performs its stately evolutions by soaring only. In alighting, the bird drops its legs some distance from the rock, and, sailing to within a few yards,



RUPPELL'S VULTURE.
(One-fifth natural size.)

it checks its velocity by two or three heavy strokes of the wings." The griffon invariably nests on rocks, and in the south of Europe probably lays in February, as young ones are commonly found in most nests early in April. During incubation one bird sits constantly, and, if driven off, immediately returns. The nest is an immense structure composed entirely of sticks, and it is common to find from two to six nests placed near together. In the case of the Himalayan species, at

any rate, but one egg is laid in each nest; the ground color being grayish white, upon which there may or may not be dark markings. In some cases the Himalayan griffon takes possession of the nest of an eagle, before its rightful owners have thought about breeding. Gifted with the power of undergoing long fasts, the griffon, when it can obtain sufficient food, is a perfect glutton, Canon Tristram mentioning that he has seen one of these birds which was too gorged to stand, continue its feast while lying on its side. Griffon vultures, both of the common species, and the kind confined to Africa, are exceedingly abundant in Abyssinia.

The long-billed vulture, which is found all over India, although it does not enter villages and towns, is remarkable for always building in large societies, which commonly include from ten to thirty pairs of birds. Such breeding places are always situated on ledges of cliffs, and one near Ajmir described by Mr. Hume "was a cliff-face some one hundred feet high by three hundred wide, all broken up into irregular ledges, of which the highest overhung all the rest. In among the ledges were a few dwarf banyan trees, whose long bare roots and rootlets hung down, here and there, in dense gray giant skeins. All the ledges, but the uppermost, when looked at from below, seemed garnished with heavy white fringes, the white droppings of the birds having run down in close parallel lines in a wonderfully symmetrical fashion over the weather-smoothed edges of the terraces. Seen from a distance, the whole cliff face seemed mottled with huge patches of whitewash. Bleached bones and dusky quills strewed every little plateau, and nestled in every cranny." The young found at the end of March are described as presenting the appearance of huge unwieldy masses of yellow down, and were so fat that they could not support themselves on their feet for more than a few moments. According to native reports, they do not leave the breeding place until three or four months old.

India and Africa each possess a vulture, agreeing with the long-billed griffon in having a white patch on the rump and lower back, but differing in having only twelve tail feathers, on which account they are assigned to a separate genus—*Pseudogyphs*. The Indian species (*P. bengalensis*) has the rest of the plumage nearly black, while in *P. africanus* it is browner. The former is the most common vulture in India, where it is found in immense numbers both in the open country and in towns; it likewise extends to Burma and Malacca. Collecting round the carcass of every dead animal in numbers, these vultures may also at times be seen perched singly on a dead human body floating down the Ganges with their wings widely spread in order to steady themselves while they enjoy their ghastly meal. They breed both on rocks and in large trees, and, like all other Indian vultures, lay but one egg in a season.

Far less common than the members of the preceding genera are the two species of eared vultures, so termed on account of the large naked fleshy lappets on either side of the neck. In addition to these lappets, and other fleshy folds about the head, these vultures are distinguished by the completely bare head, and by the length of the middle toe being less than that of the metatarsus. Of the two kinds, the African eared vulture (*Otogyphs auricularis*), which ranges from Abyssinia to the Cape, and occasionally visits the south of Europe, is considerably the larger, and is, indeed, only inferior in size to the condor, attaining a length

of some forty-five inches; the general color of its plumage is brown, and the inner surface of the thigh is feathered. In the smaller Pondicherry vulture (*O. calvus*), on the other hand, the inner surface of the thigh is naked, and the plumage black; hence it is often spoken of as the black vulture, although that name more properly belongs to the representative of the genus *Vultur*. Ranging from India through Burma to Siam, and by no means abundant in individuals, the Pondicherry vulture,



PONDICHERRY VULTURES GORGING.
(One-seventh natural size.)

according to Jerdon, is usually seen alone or in pairs, although occasionally four or five may be observed hunting in company over some rocky hill. Some of the other Indian vultures usually give place when this species arrives on the scene, on which account it is commonly known as the raj-sogno, or king vulture, among the natives of part of India. This vulture is a late breeder, generally laying in March, although some individuals begin as early as the end of January, and others delay till April.

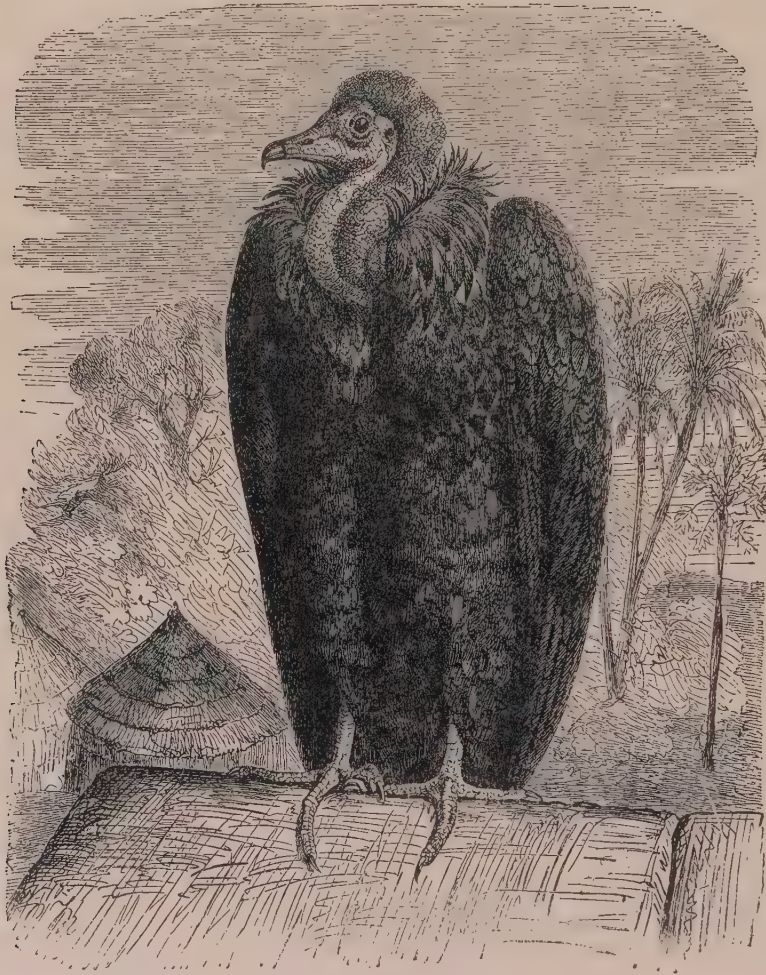
It appears to build invariably in trees; tall peepuls and banyans being its especial favorites. An anonymous writer to the *Asian* mentions that in April, 1887, he came across a nest of this vulture in Sirmur. "Being on the hillside above, I could look right down into the nest; the owner was sitting very close, and it was only when I got quite near, shouted, and threw sticks at it, that it moved; then, standing up, it opened its beak and spread out its wings by way of intimidation, at the same time disclosing to view one large white egg upon which it had been sitting. The nest, placed in the crown of the tree, was an enormous mass of sticks, with finer ones as a lining, and the large round white egg was very nearly hatched." A nest mentioned by Mr. Hume, which had been in use for several years, contained over six hundredweight of material.

Nearly allied is the Abyssinian vulture (*Lophogyps occipitalis*), distinguished by the head being covered with down, which forms a ridge on the occiput, and by the absence of the neck lappets. It is a comparatively small species, with blackish-brown plumage, and while probably inhabiting the whole of the east side of Africa, is found on the west only in Senegal.

The scavenger vultures, of which there are two well-defined species, derive their name from the loathsome nature of the food of their typical representative, which consists chiefly of ordure, and are accordingly the most disgusting of their tribe. They are distinguished from all other vultures by their elongated longitudinal nostrils, and likewise by the slenderness and length of the beak, and are smaller than the other members of the family. The head and neck are partly bare, and the wings long and somewhat pointed, with the third quill the longest. The white scavenger vulture, commonly known as the Egyptian vulture (*Neophron percnopterus*), which has occasionally visited the British Islands, and is represented in its adult and immature plumage in the centre of the plate on p. 2018, is characterized by the general white hue of the plumage of the adult. The long hackles on the back of the head and neck have, however, a rusty tinge, and the secondary quills are mostly brown, and the primaries black. The typical form, which attains a length of twenty-five inches and has the beak of a pale brown horny color, inhabits the countries bordering both sides of the Mediterranean and Red Seas, from whence it extends southward to the Cape, and eastward to Persia and Northwestern India. In Peninsular India it is replaced by a variety or species distinguished by its inferior size and yellow beak. In young birds the plumage is of a dirty-brown color, with the back and rump tawny, and during the intermediate stage the plumage becomes mottled with brown and white.

The Egyptian vulture is commonly seen in pairs or singly, and when on the ground stalks about with a peculiarly high action of the legs. In addition to the food already alluded to, these birds will also eat carrion; but their feeble beaks render them unable to tear open the tough hides of large animals, and they have to wait till the carcass is opened by their more powerful kindred. These birds build either on rocks or large buildings, or in trees, frequently in the suburbs of towns. The nest is large and composed of sticks and rubbish, usually lined with rags; its general shape being that of an irregular platform, with a slight depression in the centre. Mr. Hume observes that in many parts of India "wayfarers, as they pass

particular trees, have a semireligious custom of tearing a strip off their clothes to hang thereon, and the tree soon becomes loaded with rags and tatters. These are a perfect Godsend to the neophrons of the neighborhood, whom I have more than once watched robbing these local shrines of their trophies by the score. Sometimes the rags of various colors are laid out neatly in the nest, as if an attempt had been made to please the eye; sometimes they are irregularly jumbled up with the mate-



PILEATED VULTURE.
(One-fourth natural size.)

rials of the nest." The eggs, which are generally laid in the latter part of March, are commonly two in number, although there may be three. In size, color, and texture specimens differ much; but they are generally chalky, and vary from pure grayish or reddish white, with a few specks at one end, to a uniform dingy blood-red hue. The Egyptian vulture, or "Pharaoh's chicken," is well represented on the ancient sculptures of the country from which it takes its name, and is the bird

alluded to in Leviticus under the name of Geier eagle. On account of its value as a scavenger, it is still protected in Egypt, as it is in some other parts of Africa. In the Nile valley its usual breeding places are the tall mud cliffs bordering the river.

Pileated Vulture A very different-looking bird to the foregoing is the African pileated vulture (*N. pileatus*), in which the general color of the plumage is chocolate brown, with the quills and tail black; the naked portion of the head and neck being of a purple hue during life. In the typical South-African form the total length of the bird is some twenty-six inches, but in Northeastern and Western Africa there is a rather smaller race, with a relatively-longer and more slender beak, which has been regarded as indicating a distinct species. Compared with the Egyptian vulture, Mr. Blanford observes that the present species is "far more vulturine both in its flight and food. Numbers usually collect around a carcass, which is very rarely, if ever, the case with *N. percnopterus*. The difference is best shown in the fact that both Europeans and Eastern people frequently speak of *N. percnopterus* as a kite, while no one could ever consider *N. pileatus* as anything else than a vulture." The species is very common on the shores of Annesley bay, but is less numerous in the Abyssinian highlands.

THE SECRETARY VULTURE

Family SERPENTARIIDÆ

The well-known, but nevertheless very remarkable African bird (*Serpentarius secretarius*), represented in the figure on p. 2026, differs so widely from all other Accipitrines in external appearance that an ordinary observer might have considerable hesitation in referring it to the same order. Doubts have, indeed, been entertained by some ornithologists as to its right to be included in the Accipitrines; but it appears, on the whole, to be allied to the vultures, next to which it is placed, as the representative of a distinct family. Needless to say, the secretary derives its name from the crest of long plumes rising from the back of its head, which have suggested a fanciful resemblance to a man with a bunch of quill feathers stuck behind his ear. Structurally, the secretary vulture differs from all other members of the order by the great elongation of the tibia and metatarsus, which give it somewhat of the appearance of a crane with an eagle's beak; and it is also distinguished from the members of the two foregoing families by having basipterygoid processes on the rostrum of the skull, and its tufted oil gland. It resembles both groups, however, in having the two nostrils separated by a median partition, and by the presence of a syrinx, or organ of voice, at the lower part of its windpipe. Its short-toed feet resemble those of the caracaras in having the three front toes joined by short webs at their bases.

In addition to the crest of plumes at the back of the head and its lanky limbs, the secretary is characterized by the great prolongation of the two middle feathers

of the tail, which communicate an almost unique appearance. When adult, the bird will somewhat exceed four feet in height, while the length of the tail is just under two feet. The prevailing hue of the plumage is a delicate pearly gray, with the quills and primary coverts black, and the crest feathers either gray tipped with



SECRETARY VULTURE.
(One-eighth natural size.)

black, or wholly black. The upper tail coverts are white, and of the tail feathers the long middle pair have white tips preceded by a broad black band, but are elsewhere pure gray, while the others are darker gray, with white tips and two blackish bars. On the under parts the breast and under wing coverts are white, with a faint-ashy tinge; the thighs and abdomen black, and the under tail coverts

white. The iris is gray, and the leg and foot yellowish. The existing secretary vulture ranges over the whole of South Africa, and extends along the eastern side of the continent to the Sudan and Abyssinia, while on the west coast it is found in Senegambia. During the Miocene period the genus was represented by a species inhabiting the south of France, distinguished by its relatively-shorter and stouter legs.

Living generally in pairs, the secretary is far from uncommon in many parts of South Africa, although it is rare in the Abyssinian highlands. One of its peculiarities is the pace at which it can walk, a wounded individual being described by Mr. Blanford as walking away as fast as he could run after it. From the number of snakes, lizards, locusts, etc., taken from the stomachs of these birds, there can be no doubt but that they are in general large consumers of those reptiles and insects; although there may perhaps be some hesitation in accepting all the stories as to the large size of the snakes they habitually kill. Messrs. Nicolls and Eglington are indeed disposed to throw considerable doubts on the snake-killing propensities of these birds, and state they have known them in South Africa endeavor to avoid coming into contact with even small snakes. On the other hand, they are declared by the same writers to be deadly foes to the young of all kinds of game birds, as well as of hares and antelopes, on which account they advocate their destruction rather than their protection. In a specimen examined by Mr. H. A. Bryden the stomach was found to contain a small tortoise, a mouse, four lizards, and a large quantity of locusts. "There were no snakes," writes the narrator, "or remains of snakes; nor were there any indications that the great bird had been recently feeding on hares or game birds." We have, however, graphic accounts by Jules Verreaux of combats between the secretary bird and snakes of five or six feet in length, which always ended in the victory of the former. And other writers state that in some districts these birds feed largely on tortoises. With these differences of opinion, it is obvious that further observations are required before we can speak decisively as to the mode of life of the secretary.

With regard to its breeding habits, it appears that during June or July the males begin to fight among themselves for the possession of the females, and, as soon as the victor goes off with a consort, the two set about the repair of the nest. The latter is placed in a tall bush or a mimosa tree, and is said to be used for several years in succession. It is formed of sticks and clay at the base, while its flat top is covered with vegetable wool, feathers, and other soft substances. In August the hen bird lays from three to four eggs, which are about the size of those of a goose, and are generally either pure white, or white faintly spotted with red. During the time that the hen is sitting, she is regularly fed by the cock bird, and in the course of about six weeks the young are hatched. For a long period the young are completely helpless and unable to stand upon their long legs, and it appears that they do not leave the nest for five or six months.

In spite of spending such a large portion of its time on or near the ground, the secretary bird can fly well and strongly, although in a somewhat heavy manner. It may at times be seen soaring high in the air, with motionless, outstretched wings, after the manner of a vulture, and may always be recognized by having its head

stretched out straight in front, and its legs extended backward below the tail. When pursued, these birds generally keep to the ground, and if hunted from horseback they give a good chase, which does not end till they fall from pure exhaustion.

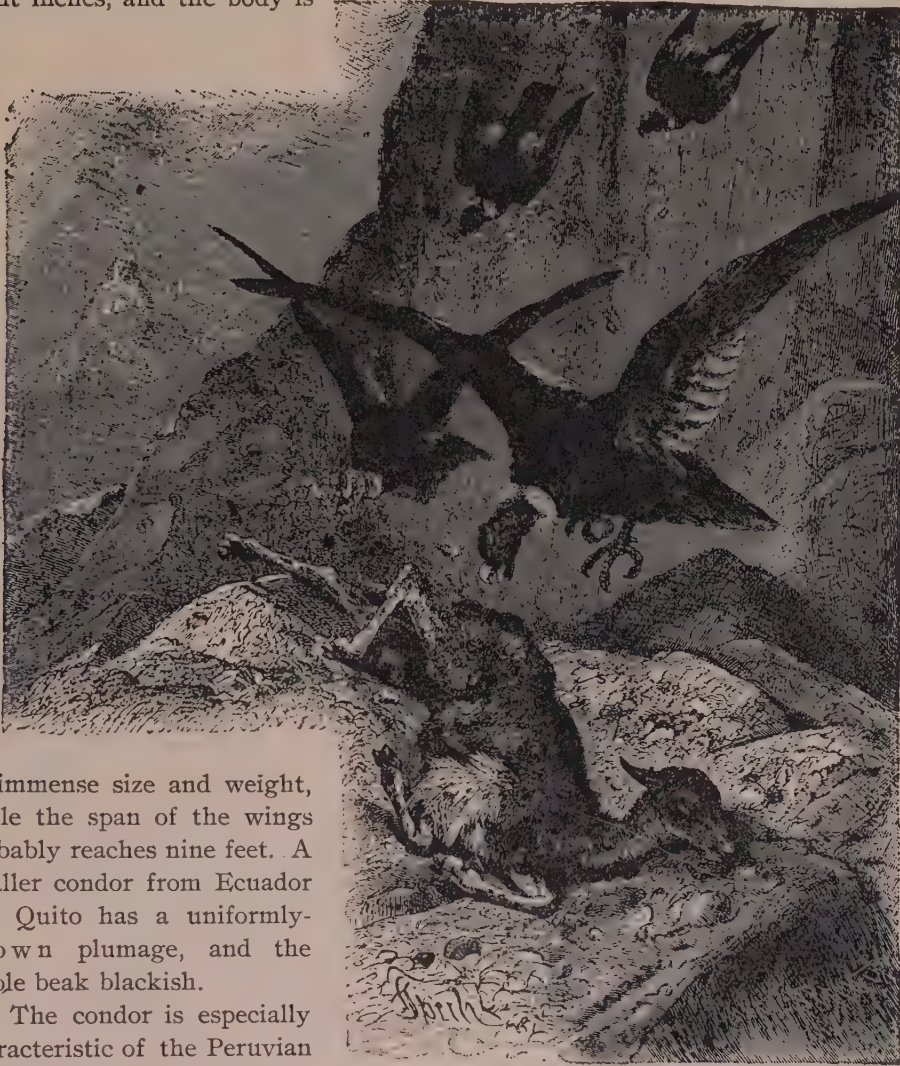
THE AMERICAN VULTURES

Family CATHARTIDÆ

That birds so closely resembling in general appearance the true vultures as do the vultures of the New World should be far less closely related to them than are the falcons or even the secretary vulture may seem extraordinary, but it is nevertheless a fact; and the external resemblance between the members of the two groups must accordingly be attributed to the effects of that parallelism in development to which we have before alluded. So different, indeed, are these birds from other Accipitrines, that it is probable the three preceding families should be brigaded in one great group equal in rank to a second including only the present family. Some ornithologists go even further than this, and refuse to admit the American vultures within the limits of the Accipitrine order; but the correctness of this view we are not yet prepared to admit. Agreeing in general appearance and their bare heads and necks with the vultures of the Old World, the American vultures can be distinguished at a glance by the absence of any partition between the two nostrils, so that (as seen in our figure of the turkey vulture on p. 2036) there is a hole right through the upper part of the beak. They also differ from the *Falconidæ* and *Vulturidæ* by the absence of aftershafts to the feathers, in which respect, as also in the presence of basipterygoid processes on the rostrum of the skull and in the naked oil gland, they resemble the owls. A remarkable peculiarity of the group is the absence of a syrinx, or voice organ, in the lower part of the windpipe, in consequence of which the only sound that these birds can utter is a kind of hiss. In their length of limb these vultures agree with the Old-World group, but the first toe is more elevated. There are, altogether, about nine species of these birds, of which the majority are at least partly South American, although the range of the family extends about as far north as the northern boundary of the United States.

Condor Largest of all the birds of prey, the condor of the Andes (*Sarcophampus gryphus*) is the type of a genus characterized by the head of the male being furnished with a large, erect, fleshy wattle, which forms a median crest immediately behind the beak, and also by the rounded wings, in which the primary and secondary quills are of nearly equal length, exceeding twice the length of the tail. The first toe is very short; while the second and fourth toes are of nearly equal length. The female lacks the head wattle of the male; but in both sexes the beak is characterized by its comparative shortness and depth. In the male condor the general color of the plumage may be described as glossy black with gray on the wings; most of the wing coverts, as well as all the secondaries and the inner primaries, having their external margins ashy white. The large downy ruff round the neck is pure white, and the bare parts of the head, neck, and chest have a wrinkled

and mostly dark-colored skin, developed into a wattle on the throat and another on the chest. Horny brown at the base, the bill becomes ivory white at the tip, while the feet are blackish, and the iris of the eye pale brown. In the smooth-headed and smaller female the iris is red, and there are no wattles on the neck and chest. According to Darwin, the length of the male is about forty-eight inches, and the body is



of immense size and weight, while the span of the wings probably reaches nine feet. A smaller condor from Ecuador and Quito has a uniformly-brown plumage, and the whole beak blackish.

The condor is especially characteristic of the Peruvian and Chilian Andes, where it is usually found in the zone lying between nine thousand and sixteen thousand feet; its range extends, however, from Quito to the extreme southern point of the continent, and in Patagonia it frequents the steep cliffs on the coast. It has been often stated that these birds may be seen soaring round the highest

CONDORS FLOCKING TO A DEAD GUANACO.

peaks of the Andes, from whence they suddenly descend to the level of the plains, but the observations of Mr. Whympers have shown that this is incorrect. In the neighborhood of Chimborazo that traveler never observed these birds anywhere near the mountain summits, whence he concludes that the upper limit of their ordinary range cannot be more than sixteen thousand feet; while in the same district they do not appear to descend below some nine thousand feet. Since, however, con-



MALE AND FEMALE CONDORS.
(One-sixth natural size.)

dors in Patagonia are commonly seen at the sea level, it is probable that there is an upland and a lowland race, and that the same birds do not range from the level of the sea to elevations of sixteen thousand feet. In regard to their habits when on the wing, Mr. Whympers writes that "on the few occasions upon which we were approached by condors in a menacing manner, we became aware of their presence from their shadows being cast upon us by a nearly vertical sun. They never came near

when the sun was concealed, and if they hovered in our neighborhood they always kept the sun at their backs. This cannot be their invariable habit in a country where the sun is so often invisible, though possibly it is adopted whenever there is a chance, and the motive is obvious. The objects to be attacked are dazzled by the



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GAUCHOS LASSOING CONDORS.

sun's rays, while the assailants are enabled to inspect their brilliantly-lighted intended victims at their ease, whose eyes are picked out at the earliest opportunity, and are thus rendered completely defenseless. The herdsmen on Autisana had lifelong familiarity with the condor, and did not stand in awe of it. They told me

that the bird was particularly addicted to old horse and young calf, and might after feeding, be easily caught with the lasso." Darwin writes that the old birds generally live in pairs, but on the inland basaltic cliffs of Santa Cruz there is a spot which used to be haunted by scores of these birds. "On coming suddenly to the brow of the precipice, it was a grand spectacle to see between twenty and thirty of these grand birds start heavily from their resting place, and wheel away in majestic circles. Having gorged themselves with carrion on the plains below, they retire to their favorite ledges to digest their food. From these facts the condor must to a certain degree be considered as a gregarious bird. In this part of the country they live altogether on the guanacos which have died a natural death, or, as more commonly happens, have been killed by the pumas. I believe, from what I saw in Patagonia, that they do not on ordinary occasions extend their daily excursions to any great distance from their regular sleeping places. The condors may often be seen at a great height, soaring over a certain spot in the most graceful circles. On some occasions I am sure that they do this only for pleasure, but on others, the Chileno countryman tells you that they are watching a dying animal, or the puma devouring its prey. If the condors glide down, and then suddenly all rise together the Chileno knows that it is the puma, which, watching the carcass, has sprung out to drive away the robbers. Besides feeding on carrion, the condors frequently attack young goats and lambs; and the shepherd dogs are trained, whenever they pass over, to run out, and looking upward to bark violently." From the feeble grasping power of their feet and especially the small size of the first toe, it is perfectly evident that condors cannot carry off animals of any size, and all the legends of their flying away with children may be discredited.

Frequently roosting in trees on the lower grounds during a considerable portion of the year, in the breeding season condors retire to the most inaccessible parts of the mountains or sea cliffs. Here during the summer months of November and December the female deposits two large white eggs on some rocky ledge, without any attempt at making a nest. The young are clothed with gray down, and remain a long time in the breeding place, where they have been observed as late as May. Owing to their destructive propensities, condors are incessantly persecuted by the natives, and have thus been greatly reduced in numbers in many districts. Mr. Whymper states, however, that as many as a dozen may still be seen at a time in the neighborhood of Chimborazo. The birds may either be lassoed when gorged, or noosed while roosting in trees; while the Chilenos also capture them by surrounding a carcass with a fence of sticks, in which an opening is left, and then galloping up on horseback when the birds are gorged, and thus inclosing them. As a condor requires a certain space in which to run before being able to rise from level ground, the fence effectually prevents their escape. To shoot a condor on the wing requires some stratagem, as at a distance of thirty or forty yards a charge of buckshot produces no effect. Mr. J. R. H. MacFarlane relates that he was able to draw the birds within distance by tying up his dog and concealing himself behind a rock close by. "Soon," he writes, "I perceived that the plaintive noises made by my dog had produced an effect; gradually the condors passed and repassed in their majestic flight, curiosity bringing them each time nearer and nearer, till at last I saw the

most inquisitive bird passing within five yards of my retreat, when to drop the lock and deliver the contents of both barrels was the work of a second. To see a heavy bird such as a mallard suddenly drop with a thud, is generally satisfactory, so my feelings may be understood when my raptorial friend plumped down about two hundred feet below, sliding and rolling down the sand of the precipice, at the foot of which I found him lying as dead as a stone."



KING VULTURE.
(One-fifth natural size.)

King Vulture The brilliantly-colored king vulture (*Cathartes papa*) is distinguished generically from the condor, to which it is far inferior in size, by the second toe being longer than the fourth, and by the whole of the front of the head of the male being covered with wattles, while the female has a single upright wattle over the nostril. During life the naked portions of the head and neck of the male are colored with shades of orange, purple, and crimson; while the

plumage of a large portion of the upper parts is cream color tending to fawn; the greater wing coverts and quills, together with the lower part of the beak, rump, upper tail coverts and tail, are black, and nearly the whole under surface white with a tinge of cream. Round the neck the feathers are deep gray; the beak is yellowish-horn color, with a brown base; the feet are grayish black, and the iris is white. The female is more soberly colored, having the whole of the upper surface dark.

The king vulture has a more northerly range than the condor, extending from Brazil to Mexico, Texas, and Florida, and also occurring in Trinidad. Reaching in the mountains to an elevation of about five thousand feet, this splendid bird has its true home in primeval forests or well-wooded plains, and it is utterly unknown in dry open districts, or on barren mountains. A comparatively-scarce bird, it roosts at night in low trees,—frequently in company,—and sallies forth at early dawn in search of carrion and other food. Although the female is known to lay two white eggs, there is some uncertainty as to the location of the nest. Azara was told by the natives that it was always placed in hollow trees, but this has been doubted by other writers, and Burmeister states that the nest is built high up on a tree, frequently on the very summit of one that is dead and bare.

American Black Vulture The two remaining genera of the New-World vultures are readily distinguished from the preceding ones by the absence of an erect wattle on the naked head in both sexes, while they are further characterized by the wings being pointed and less than twice the length of the tail, with their primary quills considerably longer than the secondaries. The present species (*Catharista atrata*), which is the sole representative of its genus, is characterized by the squared extremity of the tail, and by the interval between the tips of the primaries and secondaries being less than the length of the metatarsus. In color the black vulture is a nearly-uniform black, although the shafts of the primary quills are white on both sides, and those of the tail feathers brown above and white beneath. Both the beak and feet are bluish, while the iris is dark brown. The total length is only about twenty-five inches. Its regular range extends from about the northern frontier of Patagonia to North Carolina and Texas, while irregularly, or casually, the bird is found as far north as New York and South Dakota. In the States it is commonly known as the carrion crow. With the exception of the extreme northern portion of its range, the black vulture is a resident species in the districts it frequents; and is far more abundant near the coast than in the interior, in the United States being more numerous than the turkey vulture in the former situations, while it is outnumbered by that bird in the heart of the country. As the habits of this vulture are very similar to those of the turkey vulture, it will suffice to say that these birds are more or less gregarious, frequently breeding in small companies, and making little or no nest for the reception of their two eggs, which appear to be always placed on the ground, either under the protection of low bushes, logs, or rocks, or in perfectly open situations. They rarely breed north of latitude of 39°; and in the Southern United States the eggs are laid early in March. The ground color of the eggs is pale-grayish green, upon which are more or less reddish markings. Describing a breeding place of these birds on a small island off

South Carolina, Mr. W. Hoxie states that, under a dense growth of yucca, he has "taken nineteen eggs in one afternoon, and seen at the same time five or six pairs of newly-hatched young. There is never the slightest attempt at forming a nest, or even excavating a hollow. The eggs are laid far in under the intertwining stems of the yuccas, and, in the semishadows, are quite hard to be seen. The parent birds have, however, the habit of always following the same path in leaving and



AMERICAN BLACK VULTURE.
(One-fourth natural size.)

approaching their precious charge, and, after a little experience, I learned to distinguish these traces so well that I seldom failed to follow them up, and secure the coveted treasure."

Turkey Vulture The name of the turkey vulture, or turkey buzzard, as it is commonly called in North America, will always be associated with that of Charles Waterton, as being the bird which gave rise to the great dispute between

that original observer and Audubon as to whether vultures detected their prey by sight or smell. Although the English naturalist stoutly maintained that Audubon's experiments were inconclusive, and that the turkey vulture was solely guided by scent, the views of his adversary have been now very generally accepted. The turkey vulture (*Rhinogryphus aura*) is one of several species, distinguished from the black vulture by the rounded form of the tail, and by the interval between the tips of the primary and secondary quills exceeding the length of the metatarsus.



GROUP OF TURKEY VULTURES.
(One-sixth natural size.)

The present species is one of the smaller representatives of the genus, measuring thirty inches in length, and characterized by its plumage being generally black, with the wings washed with brown; the shafts of the primaries brown on the upper surface, and the red head. The allied *R. perniger* has the plumage all black, and the head yellow; while in *R. faldandicus* the wings are washed with gray, and the head pink; and *R. urubitinga* differs by its orange head and the white shafts on both sides of the primaries. All these three latter species are exclusively South

American. The turkey vulture, on the other hand, has the widest distribution of any member of the family, ranging over nearly the whole of temperate and tropical America, inclusive of the West Indies. Southward it extends to Patagonia and the Falkland islands, while its northern limits are marked by New York and British Columbia. In the Southern and Middle United States these birds are exceedingly common, and in some of the southern towns and villages, when not molested, they may be seen perambulating the streets, or roosting on the house tops, with perfect unconcern of the passers-by. Captain Bendire writes that "they look their best aloft, as their flight is exceedingly easy and graceful; while the apparent absence of all effort as they sail in stately manner overhead, in ever-changing circles and without any apparent movement of their well-shaped wings, makes them really attractive objects to watch." Like all their kin, they are, however, essentially scavengers, and when on the ground are by no means pleasing creatures. Dr. W. J. Ralph writes that although carrion eaters, they prefer fresh meat to that which is tainted, but that being unable to kill game for themselves, while their weak bills are incapable of tearing open the skins of large animals, they have seldom an opportunity of exercising their preference. "When they find a dead animal they will not leave it until all (but the bones and other hard parts) has been consumed, and if it be a large one, or if it have a tough skin, they will often remain near it for days, roosting at night in the trees near by. After they have eaten—and sometimes they will gorge themselves until the food runs out of their mouths when they move—they will, if they are not too full to fly, roost in the nearest trees until their meal is partly digested, and then commence eating again. Many times I have seen these birds in company with the black vulture floating down a stream on a dead alligator, cow, or other large animal, crowded so closely together that they could hardly keep their balance, and followed by a number on the wing." In spite of this close crowding, they never seem to fight much when feeding, although one will at times peck and hiss at another; and at times two will tug at a particularly tough fragment, until it either break or the weaker bird gives up his hold.

The nesting habits are very similar to those of the black vulture, although, instead of always laying its eggs on the bare ground, the present species will also nest in caverns and crevices of rocks, or in hollow trees, while it has been known to take possession of a deserted heron's nest in a cactus. Generally, the smell of a nest is unbearable, and when disturbed the parent birds have sometimes the habit of disgorging the contents of their stomachs at an intruder, instead of moving. The young, which are covered at first with soft white down, are fed in a similar manner. The eggs are usually two, but may be three in number, and an instance of four young in one nest is recorded. In color the eggs are creamy white, thickly blotched with red and chocolate. At times the nests, if such they can be called, are in companies, but at others singly. The only sound uttered is a kind of hissing wheeze, generally heard only when the birds are disturbed.

Far larger than either of the other members of the genus is the
Californian Californian vulture (*R. californianus*), which, according to Mr. F. A.
Vulture Lucas, may even exceed the condor in expanse of wing. In this bird there is no distinct ruff of downy feathers round the neck, while the general color

of the plumage is brownish black; the tips of the greater wing coverts are, however, whitish, forming a line across the closed wing, and there is a broad band of white along the under side of the wing, which renders the bird easily recognizable when flying overhead. This vulture always had a very restricted distribution, being confined to the Pacific coast region of the United States from Oregon to Northern Lower California; and it now appears to be found only in California, where its home is in the almost inaccessible secondary ranges running parallel to the Sierra Nevada. Never very numerous, the Californian vulture has been decimated by the poisoned meat laid out by the stockmen for the destruction of carnivorous mammals, and in 1891 Mr. Lucas considered that the bird was likely to be exterminated before many years. More recently, however, Captain Bendire states that in some of the most barren and inaccessible mountains these vultures have again commenced to hold their own, so that there is a possibility of their increase. Although from the weakness of their claws and beaks the powers of offense of these vultures are comparatively small in proportion to their size, yet their strength is very great, as is attested by the fact that four are known to have dragged the carcass of a young bear weighing one hundred pounds for a distance of two hundred yards. The flight of this bird, according to Captain Bendire, "is graceful beyond comparison, as it sails majestically overhead in gradually contracting or expanding circles, now gently falling with the wind, and again rising easily against it, without a perceptible motion of its pinions. While on the wing, it looks more than the peer of any of our birds, the golden eagle not excepted." Little is known of its breeding habits, but it appears that the huge nest may be placed either on rocks or in trees; one that is described being situated on the limb of a large redwood tree, at a height of seventy-five feet from the ground, and close to the stem. The eggs are of a uniform greenish-white color.

CHAPTER XIII

THE CORMORANT GROUP—ORDER STEGANOPODES

THE two ordinal groups of birds forming the subject of this and the next chapter agree with those considered in the two previous chapters in having bridged, or desmognathous palates, and likewise in the want of a projecting external process at the lower end of the humerus. The first order, which includes not only cormorants, but also darters, gannets, pelicans, and frigate and tropic birds, may be known as the cormorant-like, or steganopodous group, and is at once distinguished from all others by the whole four toes being connected together by a web, which generally extends to their extremities, while the angle of the lower jaw is not produced behind its point of attachment to the skull. These birds are further characterized by the shortness of their legs,—this shortness being most marked in the frigate birds,—and also by the plumage of the neck being without gaps, and continuous. Their skulls lack the deep grooves for glands on the frontal region characterizing many other aquatic birds, and its rostrum has no basipterygoid processes for the articulation of the pterygoid bones. There is a tufted oil gland, and the young are helpless, and pass through a downy stage.



RIGHT FOOT OF PELICAN.

As a rule, their bodies are elongated, the neck of medium length, and the head small, while the beak may be either long or short. The wings may be long and rounded, or exceedingly elongated and pointed; and although the tail is variable in form, it is always very different from that of other swimming birds. Although several members of the group frequent the coast, it is only the representatives of two families that are purely pelagic in their habits, while many species inhabit rivers or lakes far removed from the sea. All are carnivorous, subsisting almost entirely on fish, but their breeding habits vary considerably, although both parents take their share in incubation. The eggs, which may be either one, or from two to four in number, are of relatively-small size, much elongated, and generally invested with a chalky coating over the uniformly-colored shell. Occasionally, however, they are smooth shelled, with dark markings upon a light ground. While some fish by diving into the water from a height, others capture their prey by thrusting their necks down into the water as they swim, while yet others follow the fish of which they are in pursuit beneath the water. Some diversity of view obtains among ornithologists as to the number of family groups into which these birds should be divided.

CORMORANTS, DARTERS, AND GANNETS

Family *PHALACROCORACIDÆ*

The cormorants, of which there are some thirty species, are the typical representatives of the first family of the order, and are characterized by their elongated but powerful body; the long neck, which may vary considerably in thickness; the

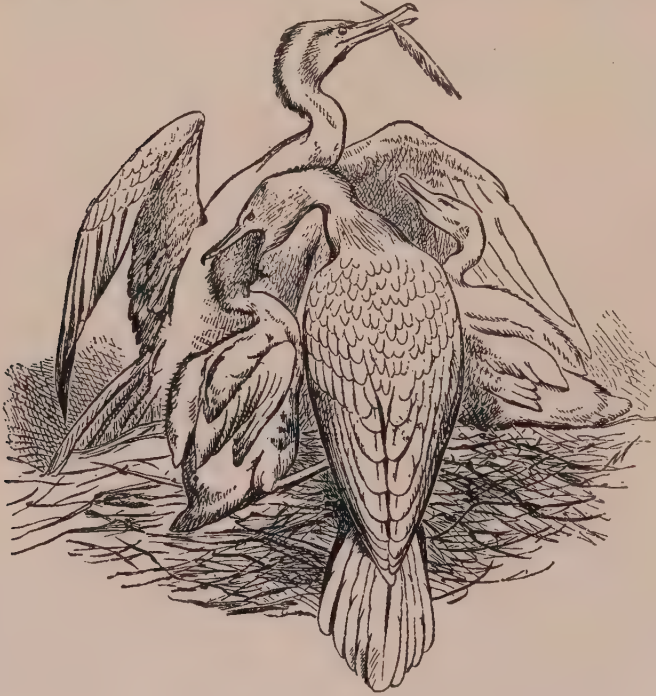


COMMON CORMORANT.

moderately-long and narrow beak, of which the tip is sharply deflected, and by their lineal and concealed nostrils. The face and throat are naked; the legs short and stout, with the first toe articulated to the inner side of the metatarsus, and the claw of the third toe has a serrated inner margin. The wings are of moderate length, with the third quill the longest, and the tail has either twelve or fourteen

feathers remarkable for their extreme stiffness. Cormorants, although far more numerous in the warmer regions of the globe than in northern climates, have an almost cosmopolitan distribution, inhabiting countries as remote from one another as Britain and New Zealand. Whereas, however, some seldom leave the neighborhood of the sea, where they take up their stations on rocky islands, others frequent reedy swamps and marshes, or the banks of rivers and lakes, and rarely, if ever, visit the sea. While the more northern species are migratory, this is not the case with their more southern cousins. Fossil cormorants date in Europe from the lower portion of the Miocene period. All cormorants are characterized by the dark blackish, bluish, or greenish hue of the plumage of the upper parts, which generally has a more or less marked metallic tinge, and the head may be ornamented with one or two crests of feathers. The best-known, and at the same time the typical representative of the genus, is the common great or black cormorant (*Phalacrocorax carbo*), which ranges over the whole of Europe, a large part of Eastern North America, Northern Africa and Egypt, and the greater portion of Asia, and is represented by a closely-allied form in Australia and New Zealand. The species is characterized by the presence of fourteen tail feathers, and attains a length of about thirty-six inches. In the adult bird the plumage of the head and part of the neck during the spring and summer is black, with a number of hair-like white feathers intermingled, while the feathers of the back of the head are elongated into a crest. The back and wing coverts are dark brown with black margins to the feathers; the quills and tail are black, and the lower portion of the neck and under parts, save a white patch on the thigh, are bluish black. Of the naked portions, the base of the upper mandible, together with the dilatable membrane of the lower jaw, are yellow, the greater part of the beak is horny, and the legs and toes are black. In the northern part of its range the common species is accompanied by the smaller green, or crested cormorant or shag (*P. graculus*), as it is indifferently called, which also ranges still farther to the north. This British species, in addition to its smaller size, may be distinguished by the presence of only twelve feathers in the tail, and the general green hue of the plumage, which lacks the white patch on the thigh. Like the larger species, both sexes have a crest in the breeding season; but this is wanting during the winter, and in young birds at all times. This cormorant is essentially a marine species. It is replaced in the Mediterranean by an allied form, *P. desmaresti* or *pygmæus*, which has brighter colored plumage, and is generally said to lack the crest. This form extends eastward to Java, and is likewise an inhabitant of salt or brackish water. The South-African *P. capensis* is also nearly related. Cormorants are by far the most expert divers of the order to which they belong, and both swim and dive with a speed and power which cannot fail to arouse the admiration of all beholders. On land their movements are awkward and ungainly, but their flight, although heavy, is strong and comparatively swift. Feeding almost exclusively on fish, these birds are the very type of greediness, and, after having eaten till they can swallow no more, will not unfrequently still try to catch any prey that may come within their reach. When fishing, cormorants often swim with their heads below water, and they also capture a large number of fish by pouncing down upon them from a perch near the bank as they appear at the surface of the water.

In general, cormorants are social birds, and frequently associate in vast flocks as is the case with the South-African species which is found in such numbers on the rocks near Cape Town as at times to darken the air when on the wing. Such companies continue together during the breeding season, and may make their nests either in the neighborhood of swamps, or on ledges of rock. In Burma Mr. Oates describes vast flocks of the common species breeding on low trees at a height of from fifteen to twenty feet above the water on the margin of a swamp, and Mr. Doig records another similar breeding place in India. In the latter instance "the nests were large platforms of sticks, about two feet in diameter one way and two and one-half the other; that is, they were more oval than circular. The eggs were



CORMORANTS FEEDING THEIR YOUNG.

(From Sclater, *Proc. Zool. Soc.*, 1882.)

laid on a thin bedding of rush and grass, and the greatest number in one nest was seven. Some had only three, others four, five, and six; the latter seeming to be the normal number, although some nests had only four young ones." That this breeding place was a very ancient one, was evident by the circumstance of the nests being built on the top of those of previous years. The eggs have a very pale-blue shell, much incrustated with chalky matter, and become very dirty during the process of incubation. In Kerguelen's Land Moseley states that the warty cormorant (*P. ver-*

rucosus) breeds in companies on the ledges of the cliffs sloping down to the sea. They make a neat, compact, round nest, raised about a foot from the ground, and composed of mud, with a lining of grass. The number of eggs in this place was only two to three in a nest. He also says that the young birds with their coat of black down were exceedingly ugly; and that "when there are three in the nest nearly full fledged they form an absurd sight, since the nest is then not big enough to hold more than one properly, so the greater part of the bodies of the three young projects out; and then to crown the absurdity, the mother comes and sits on the top of these three young as big as herself." The young feed themselves by poking their heads far down into their parents' throats, and extracting the half-digested

fish from their stomachs. Although often roosting on rocks, in some places cormorants spend the night in trees, and on some parts of the Nile in Egypt they congregate at night by hundreds in the palm trees fringing its banks.

In China and Japan cormorants have been trained to fish for their masters from time immemorial, and early in the seventeenth century this practice was introduced into Europe as a sport, which was also followed in Holland, France, and England. In the East the cormorants are taught to fish either from the bank or from a raft, and although young or imperfectly-trained birds wear a collar, to which a cord may be attached, to prevent them swallowing their prey, in many cases the fully-trained birds are allowed to fish without any kind of restraint. Till they receive permission to forage for themselves, they invariably bring all they capture to their owner; and it is said that when the bird has seized a fish too large for it to carry unaided, another immediately comes to its assistance. In captivity cormorants are readily tamed, and exhibit considerable intelligence and attachment. Although generally considered highly unpalatable, their flesh is relished by Arabs and Laps. Not only on account of being the largest member of the genus, but as having been exterminated comparatively soon after its discovery, Pallas's cormorant (*P. perspicillatus*) claims a passing notice. The plumage both above and below was a deep lustrous green, with a blue gloss on the neck, and purplish reflections on the scapulars. Long straw-colored feathers were interspersed on the neck, and the shaft of the tail feathers was white. Pale, naked rings round the eyes suggested the specific name. Discovered on Behring island in 1741, this fine species seems to have become extinct within about a century from that date.

Darters

The darters, snake birds, or snake necks, form a group of four species, readily distinguished from the cormorants by the much elongated body, the extraordinary-long and thick neck, and the small flat and narrow head terminating in a straight, conical beak with a point as sharp as a dagger, and the edges of its mandibles finely serrated at the tip. The limbs are placed very far back on the body, and have long toes; the wings are elongated, but bluntly pointed, with the third quill the longest, and the long tail is rounded, and composed of twelve stiff feathers gradually increasing in width toward their tips. Both the quills and body feathers are lustrous, and generally show metallic tints, those on the upper parts being more or less elongated. Of the four species, one (*Plotus levailanti*) is African, another (*P. anhinga*) South American, a third (*P. melanogaster*) inhabits India, Burma, and the Malay region, while the fourth is Australian. In the African species the prevailing hue of the plumage is black, with a metallic-green lustre; the feathers of the back and wing coverts having white shaft streaks. The neck is rusty, with a blackish-brown streak running backward from the eye, and beneath this a line of white. The iris is generally reddish yellow, the naked areas on the head yellowish green, the beak horn color, and the foot greenish gray. In the female the tints are less bright. The New- and Old-World species, although externally so alike, differ remarkably in the structure of their internal organs.

Darters frequent the banks of rivers, lakes, and swamps, where they may be found either singly, in pairs, or in immense flocks, and generally select localities

where trees are abundant, well-wooded islands being their especial favorites. On the rivers of the Chobi valley, Livingstone states that one of these birds may be seen perched on almost every rock and stump, "either sunning itself over the stream, or standing erect with outstretched wings. Occasionally it may be seen fishing, with its body so much submerged that hardly anything but the neck appears above the water. Its time of feeding is by night, and, as the sun declines, it may be seen



AFRICAN DARTER.
(One-fourth natural size.)

flying in flocks to the fishing grounds. It is a most difficult bird to catch, even when disabled, in consequence of its expertness in diving; it goes down so adroitly and comes up again in such unlikely places, that the most skillful boatmen rarely secure them." Of the black-bellied Indian species, Mr. G. Reid writes that "during the day it is fond of sunning itself on the grassy banks of lakes and on the bare branches of trees, on their margins flying off or darting into the water on the

approach of danger. It is capable of moving for considerable distances under water, and usually swims with nothing but its head and neck exposed, though, when danger threatens, everything but its bill disappears, till it considers it has gone far enough to be perfectly safe, when it gradually shows up again." When swimming with only the head and neck exposed, these birds may easily be mistaken for snakes, while their flight is exceedingly like that of cormorants. Their food consists exclusively of small fishes, which they capture in the water and transfix with their sharp beaks. From observations made on a captive specimen by Mr. Beddard, it appears that when fishing the darter swims beneath the surface of the water with its wings partially expanded, and with a peculiar jerky action of the head and neck, suggestive of a man poising a spear before throwing it. When within striking distance, the bird, by a vigorous lunge of the neck, impales the fish on the tip of its beak, and immediately afterward rises to the surface, when it shakes off its prey by a series of jerks of the head and neck. In order to accomplish this bayoneting process, the darter has a peculiar "kink" in the vertebræ of the hinder part of the neck, which can be suddenly straightened out by muscular action, when the head is necessarily shot forward. Darters build in trees, the African species generally placing its nest, which is very like that of the tropic bird, on a bough from four to eight feet above the water. The eggs, which are three to four in number, have light green shells, thickly incrustated with the usual chalky coating. Soon after they are hatched the young have naked heads, but are elsewhere covered with dirty white down. In India the nests are frequently built in association with those of the little cormorant and herons. Certain gypsy tribes who travel in boats on the rivers of Eastern Bengal are very fond of taming darters, each of their vessels having one of these birds sedately perched on its stern.

Gannets

The large and somewhat goose-like birds known as gannets and boobies, of which there are some nine species, are much more stoutly built than the darters, and have shorter and thicker necks and beaks. The beak is strong and conical, with its horny covering composed of several pieces, its cutting edges serrated, and its gape extending behind the level of the eyes, the nostrils being, as in the cormorants, situated at its base and almost invisible. The legs are short, and the claw of the third toe is pectinated like that of the cormorants. The wings are of great length, with the first quill the longest, and the twelve-feathered tail is rather short and wedge shaped. A naked area occupies the face and throat. The skeleton differs from that of the cormorants and darters in that the furcula is not united by bone to the summit of the breastbone.

The common or white gannet (*Sula bassana*), as the typical and best-known example of the genus, will serve as our chief example. Measuring about thirty-four inches in total length, the adult gannet has the plumage entirely white, with the exception of that of the head and neck, which is buff, and the black primaries of the wings. The beak is horny white; the naked part of the face bluish black; the iris straw color; the front of the leg and foot green, and the remainder nearly black. In young birds the plumage of the upper parts is blackish brown flecked with white, while beneath it is mingled ashy and buff. Although occasionally driven inland by stress of weather, the gannet, like its congeners, is a coast-

haunting bird, associating on certain cliffs, such as the well-known Bass Rock, in countless swarms. Its range extends over the coasts of the Northern Hemisphere as far north as latitude 70° , and as far south as the tropics; although the birds only frequent the southern portion of their habitat during the winter, and are but seldom seen at any time in the Mediterranean. In Southern Africa, the place of this species is taken by the Cape gannet (*S. capensis*), distinguished by its nearly black



COMMON GANNET.
(One-tenth natural size.)

tail; and the greater number of the representatives of the genus are inhabitants of the Southern Hemisphere. Although still breeding on the English coast at Lundy island, it is on the Scotch and Irish shores that the gannet is found in great numbers; the Bass Rock being, however, the only station on the eastern coast where these birds resort for breeding. Gannets are also abundant in the Orkneys and

Hebrides, and although less numerous on the Norwegian coasts, reappear in vast swarms on the shores of North America. The gannets on the Bass Rock have been so frequently described, that it will be unnecessary to give any account of the wondrous scene here. It may be mentioned, however, that the birds usually assemble in March, although laying does not generally commence till May; and some idea of the vast numbers of these birds may be obtained from the fact that formerly from fifteen hundred to two thousand young have been taken in a season. The nest, which is generally some six inches in height, is formed of a mass of seaweed and grass placed upon the bare rock, and in this is laid a single egg, which is at first chalky white, with a faint blue tinge. During incubation, the birds become so tame that they will allow themselves to be handled, and it is somewhat curious, that on the ledges of the Bass Rock almost all the sitting birds have their heads turned toward the cliff. Gannets feed exclusively upon fish, and commit great devastation upon the shoals of herrings and pilchards, in search of which they often wander for long distances. Couch observes that "the gannet takes its prey in a different manner from any other of our aquatic birds; for, traversing the air in all directions, as soon as it discovers the fish, it rises to such a height as experience shows best calculated to carry it by a downward motion to the required depth, and then, partially closing its wings, it falls perpendicularly on the prey, and rarely without success, the time between the plunge and immersion being about fifteen seconds." The serrated third claw of the gannet, like that of the cormorant, appears to be for the purpose of dressing the plumage, and not for aiding in the capture of the prey, which is taken entirely by means of the beak.

On many of the islands of the southern seas gannets, or boobies, of various species, breed in vast numbers and exhibit remarkable tameness, or rather absence of fear. Among such breeding places may be mentioned St. Paul's Rocks, Booby island off Fernando de Noronha, and Raine island off Northeastern Australia. The white-bellied gannet (*S. leucogaster*) of St. Paul's Rocks and Raine island, makes a slight nest of green twigs and grass on the ground; while the blue-eyed gannet (*S. cyanops*) merely digs a hole about an inch and one-half deep. The latter species is nearly white, with the naked parts of the face blue and the iris bright yellow; while the smaller Australian *S. piscatrix* differs from both the others by its bright red feet. Moseley writes that "on the low cliffs of Booby island the noddies [terns] and boobies nest on all the available ledges, and sat on their nests quite undisturbed as we rowed past them. It was curious to see the doves nesting together with these two sea birds on the same ledges and with their nests intermingled." Remains of extinct gannets are found in the lower portion of the Miocene deposits of France; while the rocks belonging to the middle portion of the same period have yielded bones of a gannet-like bird with wings even longer than those of the albatross, for which the name of *Pelargornis* has been proposed. Nearly allied to the latter is the so-called *Argillornis* from the much older London Clay of England. Still more remarkable is the tooth-billed cormorant (*Odontopteryx*), of the latter formation, which, while apparently allied to the cormorants, differs from all existing birds in having the bony margins of the jaws produced into a number of tooth-like processes.

THE PELICANS

Family *PELECANIDÆ*

Although pelicans are now quite unknown in Britain, the occurrence of their bones in the fens of Norfolk and Cambridge indicates that comparatively recently



EUROPEAN PELICAN.

they were at least occasional visitors. The largest representatives of their order, these birds are distinguished from all others by the enormous development of the beak, which is of great length, much flattened, and marked by a number of furrows. To the lower mandible is affixed a large dilatable pouch of great capacity;

so that the whole beak may be compared to a bag net, to which the upper mandible acts as a lid. The extremity of the latter ends in a slightly hooked knob, of which the horny covering is from time to time shed. The body is very massive, the neck long and comparatively slender, the head small, and the legs are short with very elongated toes. The wings, in which the third quill is the longest, are large and broad, and the tail, which contains from eighteen to twenty-four feathers, is short, broad, and rounded. Although thick, the general plumage is remarkable for its harshness and roughness, the feathers of the breast ending in narrow points; while on the back of the head there is generally a helmet-like crest. The adults of the two sexes are nearly similar in coloration, but the young are very different. In the skeleton the furcula is welded to the breastbone, as in the cormorants; but the vertebræ of the back differ from those of the latter in having saddle-shaped, instead of ball-and-socket surfaces for articulation with one another. All the bones, and likewise the integuments, are penetrated to a most remarkable extent by air cavities. Pelicans, of which there are some half score of kinds, are restricted to the tropical and warmer regions of the globe, where they have a very wide distribution. They are all very similiar in general appearance and habits, although the American white pelican (*Pelecanus trachyrhynchus*) differs from the rest in being an expert diver. The common European pelican (*P. onocrotalus*), as the best-known representative of the genus, will serve to illustrate the habits of all. It belongs to a group characterized by the feathers of the forehead extending forward in a point on to the upper part of the beak. During the breeding season the back of the head carries a somewhat elongated crest; the upper mandible is reddish at the base and yellowish at the tip, with a line of crimson along the middle, while the lower mandible is pale red, and the pouch and naked space round the eye, as well as the feet, are flesh colored. Of the plumage, the primaries and bastard wing are black; the long feathers on the front of the lower part of the neck yellow, and the remainder white, with a tinge of rose color. The tail has eighteen feathers. In birds of the first year, the plumage is a uniform grayish brown, the lanceolate feathers of the breast being wanting; and it is not for some years that the full plumage is acquired, the depth of the rose tint being most marked during the breeding season. This species, which attains a length of about five feet, inhabits the more southern parts of Europe and Northern Africa, while it also occurs in Western Africa at Senegambia and Mozambique. While common in Hungary, the Crimea, Egypt, and the Ionian islands, it only occurs occasionally in France and Algeria. In India there is a rather smaller form (*P. minor*) distinguished by the presence of a long pendent crest at all seasons; this form also ranging over Greece, Egypt, Abyssinia, and Western Africa. As to whether the common Bengal pelican is identical with the European species, there is some doubt. The other European species is the crested pelican (*P. crispus*), which belongs to the group in which the feathers of the forehead are truncated in front and terminate more or less squarely on the base of the beak. In this species the general plumage is white tinged with gray, the wing black, and the feathers of the crown and back of the head crinkled and elongated into a large crest. The eye is silver white, the beak grayish yellow above, the pouch blood red shaded with blue, and the foot black. Fossil pelicans

occur commonly in the Miocene deposits of Europe, and also in the Pliocene of Northern India.

Habits Pelicans commonly occur in enormous flocks in the neighborhood of swamps, estuaries, and rivers, and are sometimes so numerous that in India Mr. Hume speaks of having seen *miles* of them. Their food is mainly fish, of which they consume immense quantities, but crawfish have been taken from the stomach of the American species. In fishing they generally select water of sufficient depth to swim in, but which is not too deep to prevent them touching the bottom when swimming with their heads beneath the surface. In this posture a flock will frequently form a line or horseshoe, each bird stationed about a yard from its neighbor, and will fish the water in a most regular and systematic manner from bank to bank. On reaching the opposite bank, the birds will either waddle on shore to preen and dress their feathers, and afford time for the digestion of their meal, or take flight to another piece of water. In general their periods of feeding and repose are marked out with great regularity. The females attend to the feeding of the young, this being effected by the old birds pressing their beak against their breast and raising the upper mandible, upon which the young help themselves to the fish in the pouch; and it is doubtless from this action that the fable of the pelican feeding her offspring from the blood of her own breast took its origin. The eggs, from two to three in number, have thick bluish-white shells, incrustated with chalky matter; and it is not uncommon to find both eggs and half-fledged young in the same nest. In India, at least, the male and female birds not unfrequently associate in separate flocks. In spite of their bulk and clumsy form, pelicans display extreme activity when on the wing, flying in lines with the neck bent back over the body, and all who have seen flocks of these birds under such circumstances, describe it as one of the most imposing and striking scenes that can be imagined.

FRIGATE BIRDS

Family *FREGATIDÆ*

The two remaining families of the order — each represented by a single genus — differ from all the foregoing in being completely pelagic in their habits. The frigate, or man-of-war birds, are characterized by their slender body; short and thick neck; long and powerful hooked beak, of which both mandibles are deflected at the end; the extremely-short legs, feathered down to the toes; their elongated and sharply-pointed wings, and the deep, swallow-like forking of the long tail. The feet differ from those of all other members of the order by the webs only extending a short distance up the long and sharply-clawed toes; and in the wings the first quill is the longest, while the tail has twelve feathers. There is a tract devoid of feathers around the eye and on the throat. The bones are more permeated by air cavities than in any other bird, and there is a large dilatable air sac beneath the throat. In the great frigate bird (*Fregatus aquila*), which inhabits the warmer

regions of the Atlantic, Indian, and Pacific Oceans, the plumage of the adult male is brownish black, shot with metallic green and purple on the head, neck, back, breast, and sides, and shaded with gray on the wings. The eye is brown, with the surrounding bare space purplish blue; the beak is light blue at the base, white in the middle, and dark-horn color at the tip; the throat sac orange red in the breeding season, and the foot carmine red above and orange beneath. The females differ by their duller tints and the presence of a larger or smaller pure white area on the breast. The lesser frigate bird (*F. minor*) is confined to the Indian and Pacific Oceans.

The frigate bird, which has received the title of the Son-of-the-sun, is one of the most swift and active of all pelagic birds, spending much of its time on the wing, often far away from land, and subsisting largely on the fish which it compels terns and other birds to disgorge. In regard to their predatory habits, Mr. H. O. Forbes writes that in the Cocos Keeling islands hiding in the lee of the cocoanut trees, the frigate birds would sally out on the successful fishers returning in the evening, and perpetrate a vigorous assault on them until they disgorged for their behoof at least a share of their supper, which they caught in mid air as it fell. The swoop after the falling spoil was so elegant an evolution, that I always hoped that the poor noddy would give up as heavy a morsel as possible, in order to necessitate a correspondingly eager dive after it. Refractory gannets were often seized by the tail by the frigate birds, and treated to a shake that rarely failed of successful results. Fierce foes as they were in the air, on *terra firma* they roosted near each other like the best of friends. On the island of Fernando de Noronha Moseley describes the frigate birds as building their nests on the verge of an inaccessible precipice; these being visible on looking down from the top, and each containing a single egg. On the other hand, in the unmolested Raine island, these birds nest on the ground.

THE TROPIC BIRDS

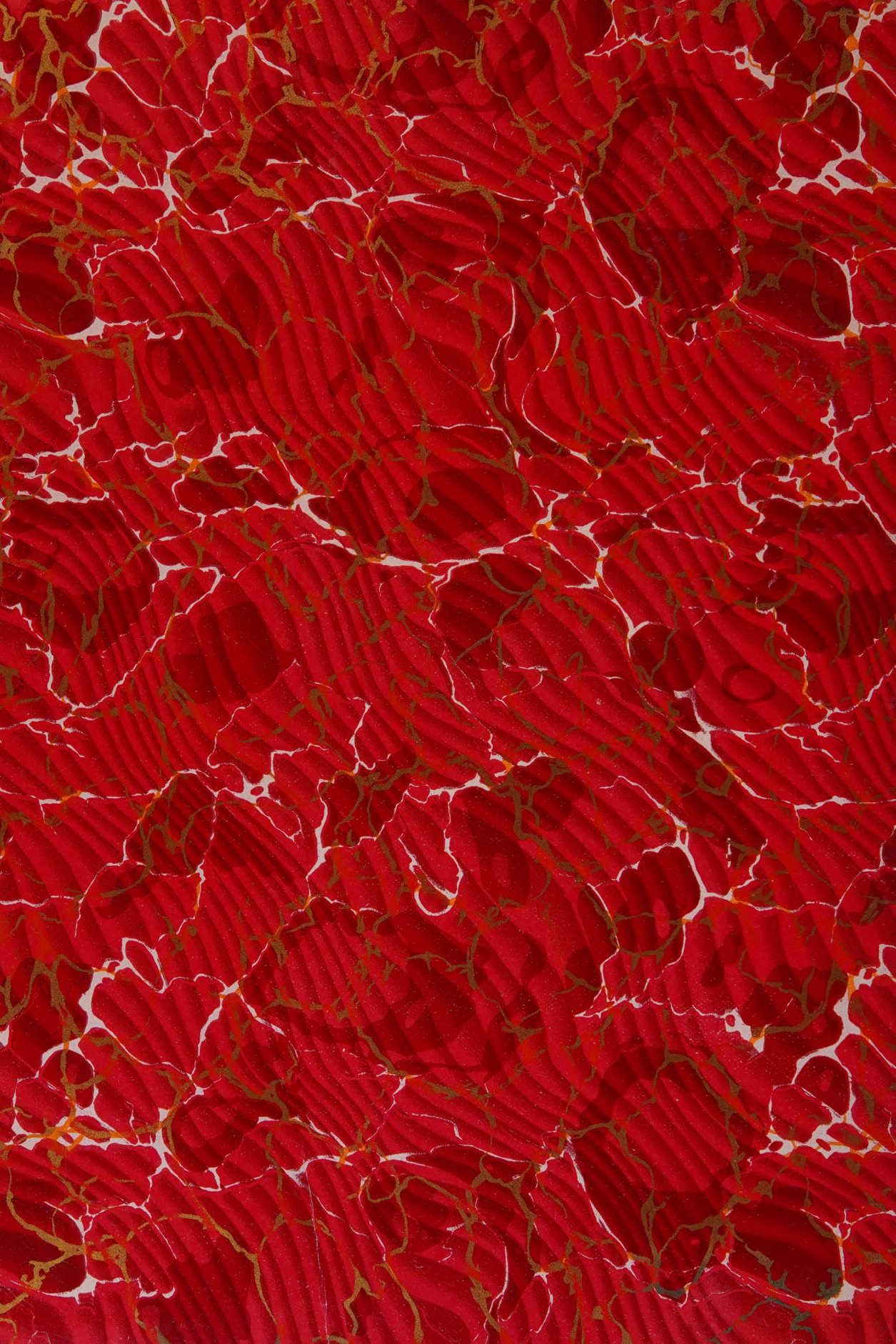
Family PHAETHONTIDÆ

The tropic birds, or "boatswains," as they are commonly called by sailors, are represented by three species, and are somewhat inferior in size to the common English gull. In general appearance they are not unlike terns, from which they are, however, distinguished at a glance by the greatly elongated middle pair of feathers of the tail. In addition to this feature, they differ from the frigate birds in their conical and pointed beak, near the base of which are situated the very large nostrils; by the longer and naked metatarsus, the completely webbed toes, and the absence of a bare space round the eye, and of a throat sac. The best-known and most widely-distributed species is the red-beaked tropic bird (*Phaethon aethereus*), ranging over the tropical regions of the three great oceans. In the adult the body plumage is white, with a reddish tinge, and black shaft stripes to the feathers; the outer webs of the primaries are white, the hinder secondaries mingled black and

white, and the two long tail feathers white. The beak is coral red, the eye brown, the leg yellow, and the web and toes black. In younger birds the feathers of the back have black bands at the tips; while in a still younger stage the middle tail feathers are not elongated, and the beak is brown. The yellow-beaked tropic bird (*P. flavirostris*) is distinguished by its yellow beak, and the red middle tail feathers. Tropic birds often follow in the wake of vessels for long distances, and display great boldness. During the breeding season they frequent the Bermuda and Pacific islands in great numbers, generally breeding in companies, and making their nests in holes in the rocks.

The writer once had the good fortune to see a living specimen of the white-tailed tropic bird, which came on board the R.M.S. *Magdalena*, in the South Atlantic on September 5, 1893, during the night, in an apparently exhausted condition. After a night's rest it recovered, and flew away on being liberated. The pearly lustre of the lovely grebe-like plumage of the head and neck was particularly striking, and the beauty of the two long tail feathers of this child of the ocean excited the admiration of all the beholders.





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